CONTAINS NO CBI

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EPA

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OMB No. 2010-0019
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EPA-OTS

00061146OI

90-890000590

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Comprehensive Assessment Information Rule

REPORTING FORM

When completed, send this form to:	For Agency Use Only:
Document Processing Center Office of Toxic Substances, TS-790 U.S. Environmental Protection Agency 401 M Street, SW Washington, DC 20460 Attention: CAIR Reporting Office	Date of Receipt: _____ Document Control Number: _____ Docket Number: _____

EPA Form 7710-52

SECTION 1 GENERAL MANUFACTURER, IMPORTER, AND PROCESSOR INFORMATION

PART A GENERAL REPORTING INFORMATION

1.01 This Comprehensive Assessment Information Rule (CAIR) Reporting Form has been completed in response to the Federal Register Notice of..... [7][2] [2][8] [8][8]
mo. day year

CBI

[ ] a. If a Chemical Abstracts Service Number (CAS No.) is provided in the Federal Register, list the CAS No. ..... [2][6][4][7][7][ ]-[6][2]-[5]

b. If a chemical substance CAS No. is not provided in the Federal Register, list either (i) the chemical name, (ii) the mixture name, or (iii) the trade name of the chemical substance as provided in the Federal Register.

(i) Chemical name as listed in the rule ..... TOLUENE DIISOCYANATE

(ii) Name of mixture as listed in the rule .... _____

(iii) Trade name as listed in the rule ..... VORANATE T-80

c. If a chemical category is provided in the Federal Register, report the name of the category as listed in the rule, the chemical substance CAS No. you are reporting on which falls under the listed category, and the chemical name of the substance you are reporting on which falls under the listed category.

Name of category as listed in the rule ..... _____

CAS No. of chemical substance ..... [ ][ ][ ][ ][ ][ ]-[ ][ ]-[ ]

Name of chemical substance ..... _____

1.02 Identify your reporting status under CAIR by circling the appropriate response(s).

CBI

Manufacturer 1

[ ] Importer 2

Processor ..... (3)

X/P manufacturer reporting for customer who is a processor 4

X/P processor reporting for customer who is a processor 5

[ ] Mark (X) this box if you attach a continuation sheet.

1.03 Does the substance you are reporting on have an "x/p" designation associated with it in the above-listed Federal Register Notice?

CBI

[ ]

Yes ..... [✓] Go to question 1.04

No ..... [ ] Go to question 1.05

1.04 a. Do you manufacture, import, or process the listed substance and distribute it under a trade name(s) different than that listed in the Federal Register Notice? Circle the appropriate response.

CBI

[ ]

Yes 1

No 2

b. Check the appropriate box below:

[ ] You have chosen to notify your customers of their reporting obligations

Provide the trade name(s) .... N/A

[ ] You have chosen to report for your customers

[ ] You have submitted the trade name(s) to EPA one day after the effective date of the rule in the Federal Register Notice under which you are reporting.

1.05 If you buy a trade name product and are reporting because you were notified of your reporting requirements by your trade name supplier, provide that trade name.

CBI

[ ]

Trade name ..... VORANATE T-80

Is the trade name product a mixture? Circle the appropriate response.

Yes 1

No 2

1.06 Certification -- The person who is responsible for the completion of this form must sign the certification statement below:

CBI

[ ]

"I hereby certify that, to the best of my knowledge and belief, all information entered on this form is complete and accurate."

PAUL Wheeler	Paul H Wheeler	
NAME	SIGNATURE	DATE SIGNED
PURCHASING/SAFETY	(601) 456 - 3055	
TITLE	TELEPHONE NO.	

[ ] Mark (X) this box if you attach a continuation sheet.

1.07 Exemptions From Reporting -- If you have provided EPA or another Federal agency with the required information on a CAIR Reporting Form for the listed substance within the past 3 years, and this information is current, accurate, and complete for the time period specified in the rule, then sign the certification below. You are required to complete section 1 of this CAIR form and provide any information now required but not previously submitted. Provide a copy of any previous submissions along with your Section 1 submission.

CBI
[ ]

"I hereby certify that, to the best of my knowledge and belief, all required information which I have not included in this CAIR Reporting Form has been submitted to EPA within the past 3 years and is current, accurate, and complete for the time period specified in the rule."

N/A		
NAME	SIGNATURE	DATE SIGNED
TITLE	(_____) _____ - _____ TELEPHONE NO.	DATE OF PREVIOUS SUBMISSION

1.08 CBI Certification -- If you have asserted any CBI claims in this report you must certify that the following statements truthfully and accurately apply to all of those confidentiality claims which you have asserted.

CBI
[ ]

"My company has taken measures to protect the confidentiality of the information, and it will continue to take these measures; the information is not, and has not been, reasonably ascertainable by other persons (other than government bodies) by using legitimate means (other than discovery based on a showing of special need in a judicial or quasi-judicial proceeding) without my company's consent; the information is not publicly available elsewhere; and disclosure of the information would cause substantial harm to my company's competitive position."

N/A		
NAME	SIGNATURE	DATE SIGNED
TITLE	(_____) _____ - _____ TELEPHONE NO.	

[ ] Mark (X) this box if you attach a continuation sheet.

PART B CORPORATE DATA

1.09 Facility Identification

CBI Name [ ][ ][ ][M][P][I][ ][I][N][C][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

[ ] Address [T][H][I][R][D][ ][ ][A][V][E][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]
Street

[H][O][U][S][T][O][N][ ]
City

[M][S] [3][8][8][5][7]--[ ][ ][ ][ ]
State Zip

Dun & Bradstreet Number .....[0][0]-[7][7][4]-[0][0][6][4]

EPA ID Number .....[ ][ ][ ][ ][ ][ ][ ][ ][ ]

Employer ID Number .....[7][4][0][3][2][4][6][3]02

Primary Standard Industrial Classification (SIC) Code .....[3][0][8][6]

Other SIC Code .....[ ][ ][ ][ ]

Other SIC Code .....[ ][ ][ ][ ]

1.10 Company Headquarters Identification

CBI Name [L][E][G][G][E][T][T][ ][H][ ][P][L][A][T][T][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

[ ] Address [7][ ][L][e][G][G][E][T][T][ ][R][D][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]
Street

[C][A][R][T][H][A][G][E][ ]
City

[M][O] [6][4][8][3][6]--[ ][ ][ ][ ]
State Zip

Dun & Bradstreet Number .....[0][0]-[7][7][4]-[0][0][6][4]

Employer ID Number .....[7][4][0][3][2][4][6][3]02

[ ] Mark (X) this box if you attach a continuation sheet.

1.11 Parent Company Identification

CBI Name [ ]

[ ] Address [ ]
Street

[ ]
City

[ ] [ ]
State Zip

Dun & Bradstreet Number .....[ ]-[ ]-[ ]

1.12 Technical Contact

CBI Name [DAULWAEELER]

[ ] Title [SAFETY COORDINATOR]

Address [CO]
Street

[HOUSTON]
City

[MS] [38857]--[0000]
State Zip

Telephone Number .....[601]-[456]-[3051]

1.13 This reporting year is from ..... [01] [88] to [12] [88]
Mo. Year Mo. Year

[ ] Mark (X) this box if you attach a continuation sheet.

1.14 Facility Acquired -- If you purchased this facility during the reporting year, provide the following information about the seller:

CBI Name of Seller [__]

[__] Mailing Address [__]
Street

[__]
City

[__][__] [__][__][__][__][__]--[__][__][__][__]
State Zip

Employer ID Number .....[__][__][__][__][__][__][__][__][__]

Date of Sale .....[__][__] [__][__] [__][__]
Mo. Day Year

Contact Person [__]

Telephone Number .....[__][__][__]-[__][__][__]-[__][__][__][__]

1.15 Facility Sold -- If you sold this facility during the reporting year, provide the following information about the buyer:

CBI Name of Buyer [__]

[__] Mailing Address [__]
Street

[__]
City

[__][__] [__][__][__][__][__]--[__][__][__][__]
State Zip

Employer ID Number .....[__][__][__][__][__][__][__][__][__]

Date of Purchase .....[__][__] [__][__] [__][__]
Mo. Day Year

Contact Person [__]

Telephone Number .....[__][__][__]-[__][__][__]-[__][__][__][__]

[__] Mark (X) this box if you attach a continuation sheet.

1.16 For each classification listed below, state the quantity of the listed substance that was manufactured, imported, or processed at your facility during the reporting year.

CBI [ ]	Classification	Quantity (kg/yr)
	Manufactured	Ø
	Imported	Ø
	Processed (include quantity repackaged)	391,952
	Of that quantity manufactured or imported, report that quantity:	
	In storage at the beginning of the reporting year	Ø
	For on-site use or processing	Ø
	For direct commercial distribution (including export)	Ø
	In storage at the end of the reporting year	Ø
	Of that quantity processed, report that quantity:	
	In storage at the beginning of the reporting year	76,020
✓	Processed as a reactant (chemical producer)	391,952
	Processed as a formulation component (mixture producer)	Ø
	Processed as an article component (article producer)	Ø
	Repackaged (including export)	Ø
	In storage at the end of the reporting year	47,768

[ ] Mark (X) this box if you attach a continuation sheet.

PART C IDENTIFICATION OF MIXTURES

1.17 Mixture -- If the listed substance on which you are required to report is a mixture or a component of a mixture, provide the following information for each component chemical. (If the mixture composition is variable, report an average percentage of each component chemical for all formulations.)

CBI

[ ]

Component Name	Supplier Name	Average % Composition by Weight (specify precision, e.g., 45% ± 0.5%)
Toluene Diisocyanate 2,4	Dow Chemical	80%
Toluene Diisocyanate 2,6	" "	20%
	Total	100%

[ ] Mark (X) this box if you attach a continuation sheet.

2.04 State the quantity of the listed substance that your facility manufactured, imported, or processed during the 3 corporate fiscal years preceding the reporting year in descending order.

CBI

[ ] Year ending ..... [1][2] Mo. [8][7] Year

Quantity manufactured ..... 0 kg

Quantity imported ..... 0 kg

Quantity processed ..... 403,066 kg

Year ending ..... [1][2] Mo. [8][6] Year

Quantity manufactured ..... 0 kg

Quantity imported ..... 0 kg

Quantity processed ..... 468,805 kg

Year ending ..... [1][2] Mo. [8][5] Year

Quantity manufactured ..... 0 kg

Quantity imported ..... 0 kg

Quantity processed ..... kg

2.05 Specify the manner in which you manufactured the listed substance. Circle all appropriate process types.

CBI

[ ]

Continuous process 1

Semicontinuous process 2

Batch process ..... (3)

[ ] Mark (X) this box if you attach a continuation sheet.

2.06 Specify the manner in which you processed the listed substance. Circle all appropriate process types.

CBI

[ ]

Continuous process 1

Semicontinuous process 2

Batch process ..... (3)

2.07 State your facility's name-plate capacity for manufacturing or processing the listed substance. (If you are a batch manufacturer or batch processor, do not answer this question.)

CBI

[ ]

Manufacturing capacity ..... Ø kg/yr

Processing capacity ..... Ø kg/yr

2.08 If you intend to increase or decrease the quantity of the listed substance manufactured, imported, or processed at any time after your current corporate fiscal year, estimate the increase or decrease based upon the reporting year's production volume.

CBI

[ ]

	Manufacturing Quantity (kg)	Importing Quantity (kg)	Processing Quantity (kg)
Amount of increase			N/A
Amount of decrease			N/A

[ ] Mark (X) this box if you attach a continuation sheet.

2.09 For the three largest volume manufacturing or processing process types involving the listed substance, specify the number of days you manufactured or processed the listed substance during the reporting year. Also specify the average number of hours per day each process type was operated. (If only one or two operations are involved, list those.)

CBI

[ ]

	Days/Year	Average Hours/Day
Process Type #1 (The process type involving the largest quantity of the listed substance.)		
Manufactured	Ø	Ø
Processed	249	18.6
Process Type #2 (The process type involving the 2nd largest quantity of the listed substance.)		
Manufactured	Ø	Ø
Processed		
Process Type #3 (The process type involving the 3rd largest quantity of the listed substance.)		
Manufactured	Ø	Ø
Processed		

2.10 State the maximum daily inventory and average monthly inventory of the listed substance that was stored on-site during the reporting year in the form of a bulk chemical.

CBI

[ ]

Maximum daily inventory	47,768	kg
Average monthly inventory	16,020	kg

[ ] Mark (X) this box if you attach a continuation sheet.

2.11 Related Product Types -- List any byproducts, coproducts, or impurities present with the listed substance in concentrations greater than 0.1 percent as it is manufactured, imported, or processed. The source of byproducts, coproducts, or impurities means the source from which the byproducts, coproducts, or impurities are made or introduced into the product (e.g., carryover from raw material, reaction product, etc.).

CBI

[ ]

CAS No.	Chemical Name	Byproduct, Coproduct or Impurity[1]	Concentration (%) (specify ± % precision)	Source of Byproducts, Coproducts, or Impurities
	N/A			

[1]Use the following codes to designate byproduct, coproduct, or impurity:

B = Byproduct
C = Coproduct
I = Impurity

[ ] Mark (X) this box if you attach a continuation sheet.

2.12 Existing Product Types -- List all existing product types which you manufactured, imported, or processed using the listed substance during the reporting year. List the quantity of listed substance you use for each product type as a percentage of the total volume of listed substance used during the reporting year. Also list the CBI quantity of listed substance used captively on-site as a percentage of the value [ ] listed under column b., and the types of end-users for each product type. (Refer to the instructions for further explanation and an example.)

a. Product Types[1]	b. % of Quantity Manufactured, Imported, or Processed	c. % of Quantity Used Captively On-Site	d. Type of End-Users[2]
K	100	100	CM/CS

[1]Use the following codes to designate product types:

A = Solvent
B = Synthetic reactant
C = Catalyst/Initiator/Accelerator/Sensitizer
D = Inhibitor/Stabilizer/Scavenger/Antioxidant
E = Analytical reagent
F = Chelator/Coagulant/Sequestrant
G = Cleanser/Detergent/Degreaser
H = Lubricant/Friction modifier/Antiwear agent
I = Surfactant/Emulsifier
J = Flame retardant
K = Coating/Binder/Adhesive and additives
L = Moldable/Castable/Rubber and additives
M = Plasticizer
N = Dye/Pigment/Colorant/Ink and additives
O = Photographic/Reprographic chemical and additives
P = Electrodeposition/Plating chemicals
Q = Fuel and fuel additives
R = Explosive chemicals and additives
S = Fragrance/Flavor chemicals
T = Pollution control chemicals
U = Functional fluids and additives
V = Metal alloy and additives
W = Rheological modifier
X = Other (specify) _____

[2]Use the following codes to designate the type of end-users:

I = Industrial
CM = Commercial
CS = Consumer
H = Other (specify) CM

[ ] Mark (X) this box if you attach a continuation sheet.

2.13 Expected Product Types -- Identify all product types which you expect to manufacture, import, or process using the listed substance at any time after your current corporate fiscal year. For each use, specify the quantity you expect to manufacture, import, or process for each use as a percentage of the total volume of listed substance used during the reporting year. Also list the quantity of listed substance used captively on-site as a percentage of the value listed under column b., and the types of end-users for each product type. (Refer to the instructions for further explanation and an example.)

CBI

[ ]

a. Product Types[1]	b. % of Quantity Manufactured, Imported, or Processed	c. % of Quantity Used Captively On-Site	d. Type of End-Users[2]
K	100	100	CM/CS

[1]Use the following codes to designate product types:

A = Solvent
B = Synthetic reactant
C = Catalyst/Initiator/Accelerator/Sensitizer
D = Inhibitor/Stabilizer/Scavenger/Antioxidant
E = Analytical reagent
F = Chelator/Coagulant/Sequestrant
G = Cleanser/Detergent/Degreaser
H = Lubricant/Friction modifier/Antiwear agent
I = Surfactant/Emulsifier
J = Flame retardant
K = Coating/Binder/Adhesive and additives
L = Moldable/Castable/Rubber and additives
M = Plasticizer
N = Dye/Pigment/Colorant/Ink and additives
O = Photographic/Reprographic chemical and additives
P = Electrodeposition/Plating chemicals
Q = Fuel and fuel additives
R = Explosive chemicals and additives
S = Fragrance/Flavor chemicals
T = Pollution control chemicals
U = Functional fluids and additives
V = Metal alloy and additives
W = Rheological modifier
X = Other (specify) _____

[2]Use the following codes to designate the type of end-users:

I = Industrial
CM = Commercial
CS = Consumer
H = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

2.14 CBI [ ] Final Product -- Complete the following table for each type of final product manufactured, imported, or processed at your facility that contains the listed substance other than as an impurity.

a. Product Type[1]	b. Final Product's Physical Form[2]	c. Average % Composition of Listed Substance in Final Product	d. Type of End-Users[3]
N/A	N/A	N/A	N/A

[1]Use the following codes to designate product types:

A = Solvent
B = Synthetic reactant
C = Catalyst/Initiator/Accelerator/Sensitizer
D = Inhibitor/Stabilizer/Scavenger/Antioxidant
E = Analytical reagent
F = Chelator/Coagulant/Sequestrant
G = Cleanser/Detergent/Degreaser
H = Lubricant/Friction modifier/Antiwear agent
I = Surfactant/Emulsifier
J = Flame retardant
K = Coating/Binder/Adhesive and additives
L = Moldable/Castable/Rubber and additives
M = Plasticizer
N = Dye/Pigment/Colorant/Ink and additives
O = Photographic/Reprographic chemical and additives
P = Electrodeposition/Plating chemicals
Q = Fuel and fuel additives
R = Explosive chemicals and additives
S = Fragrance/Flavor chemicals
T = Pollution control chemicals
U = Functional fluids and additives
V = Metal alloy and additives
W = Rheological modifier
X = Other (specify) _____

[2]Use the following codes to designate the final product's physical form:

A = Gas
B = Liquid
C = Aqueous solution
D = Paste
E = Slurry
F1 = Powder
F2 = Crystalline solid
F3 = Granules
F4 = Other solid
G = Gel
H = Other (specify) _____

[3]Use the following codes to designate the type of end-users:

I = Industrial
CM = Commercial
CS = Consumer
H = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

2.15 CBI Circle all applicable modes of transportation used to deliver bulk shipments of the listed substance to off-site customers.

[ ] Truck 1

Railcar 2

Barge, Vessel 3

Pipeline 4

Plane 5

Other (specify) NONE 6

2.16 CBI Customer Use -- Estimate the quantity of the listed substance used by your customers or prepared by your customers during the reporting year for use under each category of end use listed (i-iv).

[ ]

Category of End Use

i. Industrial Products

Chemical or mixture ..... NONE kg/yr

Article ..... kg/yr

ii. Commercial Products

Chemical or mixture ..... kg/yr

Article ..... kg/yr

iii. Consumer Products

Chemical or mixture ..... kg/yr

Article ..... kg/yr

iv. Other

Distribution (excluding export) ..... kg/yr

Export ..... kg/yr

Quantity of substance consumed as reactant ..... kg/yr

Unknown customer uses ..... kg/yr

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 3 PROCESSOR RAW MATERIAL IDENTIFICATION

PART A GENERAL DATA

3.01 Specify the quantity purchased and the average price paid for the listed substance for each major source of supply listed. Product trades are treated as purchases.
CBI The average price is the market value of the product that was traded for the listed substance.
[ ]

Source of Supply	Quantity (kg)	Average Price ($/kg)
The listed substance was manufactured on-site.	Ø	
The listed substance was transferred from a different company site.	Ø	
The listed substance was purchased directly from a manufacturer or importer.	391,952.38	$1.81071
The listed substance was purchased from a distributor or repackager.	Ø	
The listed substance was purchased from a mixture producer.	Ø	

3.02 Circle all applicable modes of transportation used to deliver the listed substance to your facility.
CBI
[ ]

Truck ..... (1)
Railcar ..... (2)
Barge, Vessel 3
Pipeline 4
Plane 5
Other (specify) _____ 6

[ ] Mark (X) this box if you attach a continuation sheet.

3.03 a. Circle all applicable containers used to transport the listed substance to your CBI facility.

[ ]

Bags 1

Boxes 2

Free standing tank cylinders 3

Tank rail cars ..... (4)

Hopper cars 5

Tank trucks ..... (6)

Hopper trucks 7

Drums 8

Pipeline 9

Other (specify) _____ 10

b. If the listed substance is transported in pressurized tank cylinders, tank rail cars, or tank trucks, state the pressure of the tanks.

Tank cylinders ..... N/A mmHg

Tank rail cars ..... N/A mmHg

Tank trucks ..... N/A mmHg

[ ] Mark (X) this box if you attach a continuation sheet.

PART B RAW MATERIAL IN THE FORM OF A MIXTURE

3.04 If you obtain the listed substance in the form of a mixture, list the trade name(s) of the mixture, the name of its supplier(s) or manufacturer(s), an estimate of the CBI average percent composition by weight of the listed substance in the mixture, and the amount of mixture processed during the reporting year.

[ ]

Trade Name	Supplier or Manufacturer	Average % Composition by Weight (specify ± % precision)	Amount Processed (kg/yr)
N/A			

[ ] Mark (X) this box if you attach a continuation sheet.

PART C RAW MATERIAL VOLUME

3.05 CBI [ ] State the quantity of the listed substance used as a raw material during the reporting year in the form of a class I chemical, class II chemical, or polymer, and the percent composition, by weight, of the listed substance.

	Quantity Used (kg/yr)	% Composition by Weight of Listed Substance in Raw Material (specify ± % precision)
Class I chemical	391,952	100
Class II chemical		
Polymer		

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 4 PHYSICAL/CHEMICAL PROPERTIES

General Instructions:

If you are reporting on a mixture as defined in the glossary, reply to questions in Section 4 that are inappropriate to mixtures by stating "NA -- mixture."

For questions 4.06-4.15, if you possess any hazard warning statement, label, MSDS, or other notice that addresses the information requested, you may submit a copy or reasonable facsimile in lieu of answering those questions which it addresses.

PART A PHYSICAL/CHEMICAL DATA SUMMARY

4.01 Specify the percent purity for the three major[1] technical grade(s) of the listed substance as it is manufactured, imported, or processed. Measure the purity of the substance in the final product form for manufacturing activities, at the time you import the substance, or at the point you begin to process the substance.

CBI
[ ]

	Manufacture	Import	Process
Technical grade #1	N/A % purity	N/A % purity	98 % purity
Technical grade #2	N/A % purity	N/A % purity	N/A % purity
Technical grade #3	N/A % purity	N/A % purity	N/A % purity

[1]Major = Greatest quantity of listed substance manufactured, imported or processed.

4.02 Submit your most recently updated Material Safety Data Sheet (MSDS) for the listed substance, and for every formulation containing the listed substance. If you possess an MSDS that you developed and an MSDS developed by a different source, submit your version. Indicate whether at least one MSDS has been submitted by circling the appropriate response.

Yes ..... (1)

No 2

Indicate whether the MSDS was developed by your company or by a different source.

Your company 1

Another source ..... (2)

[X] Mark (X) this box if you attach a continuation sheet.

M A T E R I A L S A F E T Y D A T A S H E E T

Dow Chemical U.S.A.* Midland, MI 48674 Emergency Phone: 517-636-4400

PRODUCT NAME: VORANATE (R) T-80 TYPE II TOLUENE DIISOCYANATE

Effective Date: 12/13/88 Date Printed: 05/03/89 MSD: 000609

1. INGREDIENTS: (% w/w, unless otherwise noted)

Toluene-2,4-diisocyanate (TDI)	CAS# 000584-84-9	80%
Toluene-2,6-diisocyanate	CAS# 000091-08-7	20%

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

2. PHYSICAL DATA:

BOILING POINT: 250C (482F)
VAP PRESS: 0.01 mmHg @ 20C
VAP DENSITY: 6.0
SOL. IN WATER: Insoluble
SP. GRAVITY: 1.22 @ 25/15.5C
APPEARANCE: Water white to pale yellow liquid.
ODOR: Sharp pungent odor.

3. FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT: 127C (260F)
METHOD USED: PMCC, ASTM D-93

FLAMMABLE LIMITS
LFL: Not determined
UFL: Not determined

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, or foam. If water is used, it should be in very large quantity. The reaction between water and hot isocyanate may be vigorous.

FIRE & EXPLOSION HAZARDS: Down-wind personnel must be evacuated. Do not reseal contaminated containers since pressure build-up may cause rupture. Fire point: 146C (295F).

FIRE-FIGHTING EQUIPMENT: People who are fighting isocyanate fires must be protected against nitrogen oxide fumes and isocyanate vapors by wearing positive pressure self-contained breathing

(Continued on Page 2)

* An Operating Unit Of The Dow Chemical Company

3. FIRE AND EXPLOSION HAZARD DATA: (CONTINUED)

apparatus and full protective clothing.

4. REACTIVITY DATA:

STABILITY: (CONDITIONS TO AVOID). Stable when stored under recommended storage conditions. Store in a dry place at temperatures between 18-41C (65-105F).

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Water, acid, base, alcohols, metal compounds, surface active materials. Avoid water as it reacts to form heat, CO2 and insoluble urea. The combined effect of the CO2 and heat can produce enough pressure to rupture a closed container.

HAZARDOUS DECOMPOSITION PRODUCTS: Isocyanate vapor and mist, carbon dioxide, carbon monoxide, nitrogen oxides and traces of hydrogen cyanide.

HAZARDOUS POLYMERIZATION: May occur with incompatible reactants, especially strong bases, water or temperatures over 41C (105F).

5. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS/LEAKS:

Evacuate and ventilate spill area, dike spill to prevent entry into water system, wear full protective equipment including respiratory equipment during clean up.

Major spill: Call Dow Chemical U.S.A. (409) 238-2112. If transportation spill involved call CHEMTREC (800) 424-9300. If temporary control of isocyanate vapor is required a blanket of protein foam (available at most fire departments) may be placed over the spill. Large quantities may be pumped into closed but not sealed containers for disposal.

Minor spill: Absorb the isocyanate with sawdust or other absorbent and shovel into open top containers. Do not make pressure tight. Transport to a well-ventilated area (outside) and treat with neutralizing solution consisting of a mixture of

(Continued on Page 3)

5. ENVIRONMENTAL AND DISPOSAL INFORMATION: (CONTINUED)

water and 3-8% concentrated ammonium hydroxide or 5-10% sodium carbonate. Add about 10 parts of neutralizer per part of isocyanate with mixing. Allow to stand for 48 hours letting evolved carbon dioxide to escape.

Clean-up: Decontaminate floor using water/ammonia solution with 1-2% added detergent letting stand over affected area for at least 10 minutes. Cover mops and brooms used for this with plastic and dispose properly (often by incineration).

DISPOSAL METHOD: Follow all federal, state and local regulations. Liquids are usually incinerated in a proper facility. Solids are usually also incinerated or landfilled. Empty drums should be filled with water. Let drum stand unsealed for 48 hours. Before disposal drums should be drained, triple rinsed, and holed to prevent reuse. Dispose of drain and rinse fluid according to federal, state and local laws and regulations. The most commonly accepted method is in an approved wastewater treatment facility. Drums should be disposed of in accordance with federal, state and local laws and regulations. Commonly accepted methods for disposal of plastic drums are disposal in an approved landfill after shredding or incineration in an approved industrial incinerator or other appropriate incinerator facility. Steel drums are commonly disposed in an approved landfill after crushing or in accordance with other approved procedures.

6. HEALTH HAZARD DATA:

EYE: May cause pain, severe eye irritation and moderate corneal injury. Vapors may irritate eyes.

SKIN CONTACT: Prolonged or repeated exposure may cause severe irritation, even a burn. Skin contact may result in allergic reaction even though it is not expected to result in absorption of amounts sufficient to cause other adverse effects.

SKIN ABSORPTION: The LD50 for skin absorption in rabbits is >9400 mg/kg.

(Continued on Page 4)

6. HEALTH HAZARD DATA: (CONTINUED)

INGESTION: Single dose oral toxicity is low. The oral LD50 for rats is 5800 mg/kg. Ingestion may cause gastrointestinal irritation or ulceration.

INHALATION: Excessive vapor concentrations are attainable and could be hazardous on single exposure. Single and repeated excessive exposure may cause severe irritation to upper respiratory tract and lungs (choking sensation, chest tightness), respiratory sensitization, decreased ventilatory capacity, liver effects, cholinesterase depression, gastrointestinal distress and/or neurologic disorders. The 4-hour LC50 for TDI for rats is 13.9 ppm.

SYSTEMIC & OTHER EFFECTS: Based on available data, repeated exposures are not anticipated to cause any additional significant adverse effects. For hazard communication purposes under OSHA standard 29 CFR Part 1910.1200, this chemical is listed as a potential carcinogen by Nat'l. Tox. Program and IARC. An oral study in which high doses of TDI were reported to cause cancer in animals has been found to contain numerous deficiencies which compromise the validity of the study. TDI did not cause cancer in laboratory animals exposed by inhalation, the most likely route of exposure. Birth defects are unlikely. Exposures having no effect on the mother should have no effect on the fetus. Did not cause birth defects in animals; other effects were seen in the fetus only at doses which caused toxic effects to the mother. Results of in vitro ("test tube") mutagenicity tests have been inconclusive.

7. FIRST AID:

EYES: Irrigate with flowing water immediately and continuously for 15 minutes. Consult medical personnel.

SKIN: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician if irritation persists. Wash clothing before reuse. Destroy contaminated shoes.

INGESTION: Do not induce vomiting. Call a physician and/or

(Continued on Page 5)

7. FIRST AID: (CONTINUED)

transport to emergency facility immediately.

INHALATION: Remove to fresh air. If not breathing, give mouth-to-mouth resuscitation. If breathing is difficult, give oxygen. Call a physician.

NOTE TO PHYSICIAN: May cause tissue destruction leading to stricture. If lavage is performed, suggest endotracheal and/or esophagoscopic control. If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient. The manifestations of the respiratory symptoms, including pulmonary edema, resulting from acute exposure may be delayed. May cause respiratory sensitization. Cholinesterase inhibition has been noted in human exposure but is not of benefit in determining exposure and is not correlated with signs of exposure.

8. HANDLING PRECAUTIONS:

EXPOSURE GUIDELINE(S): OSHA PEL is 0.02 ppm as a ceiling limit for toluene 2,4-diisocyanate. ACGIH TLV is 0.005 ppm; 0.02 ppm STEL for toluene 2,4-diisocyanate. Dow Industrial Hygiene Guide is 0.02 ppm as a ceiling limit for toluene diisocyanate.

VENTILATION: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved supplied-air respirator. For emergency and other conditions where the exposure guideline may be greatly exceeded, use an approved positive-pressure self-contained breathing apparatus.

SKIN PROTECTION: Use protective clothing impervious to this material. Selection of specific items such as gloves, boots, apron, or full-body suit will depend on operation. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse. Safety shower should

(Continued on Page 6)

8. HANDLING PRECAUTIONS: (CONTINUED)

be located in immediate work area.

EYE PROTECTION: Use chemical goggles. If vapor exposure causes eye irritation, use a full-face, supplied-air respirator. Eye wash fountain should be located in immediate work area.

9. ADDITIONAL INFORMATION:

REGULATORY REQUIREMENTS:

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

An immediate health hazard
A delayed health hazard
A reactive hazard

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Warning properties of this material (irritation of eyes, nose and throat) not adequate to prevent chronic overexposure from inhalation. This material can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation exposure to lower concentrations. Exposures to vapors of heated TDI can be extremely dangerous. (Have TDI neutralizer available for spills.)

MSDS STATUS: Revised Section 9

SARA 313 INFORMATION:
This product contains the following substances subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

(Continued on Page 7)

9. ADDITIONAL INFORMATION: (CONTINUED)

CHEMICAL NAME	CAS NUMBER	CONCENTRATION	
TOLUENE-2,6-DIISOCYANATE	000091-08-7	20	%
TOLUENE-2,4-DIISOCYANATE	000584-84-9	80	%

4.03 Submit a copy or reasonable facsimile of any hazard information (other than an MSDS) that is provided to your customers/users regarding the listed substance or any formulation containing the listed substance. Indicate whether this information has been submitted by circling the appropriate response.

Yes 1

No ..... (2)

4.04 For each activity that uses the listed substance, circle all the applicable number(s) corresponding to each physical state of the listed substance during the activity listed. Physical states for importing and processing activities are determined at the time you import or begin to process the listed substance. Physical states for manufacturing, storage, disposal and transport activities are determined using the final state of the product.

CBI

[ ]

	Physical State				
Activity	Solid	Slurry	Liquid	Liquified Gas	Gas
Manufacture	1	2	3	4	5
Import	1	2	3	4	5
Process	1	2	(3)	4	5
Store	1	2	3	4	5
Dispose	1	2	3	4	5
Transport	1	2	3	4	5

[ ] Mark (X) this box if you attach a continuation sheet.

4.05 Particle Size -- If the listed substance exists in particulate form during any of the following activities, indicate for each applicable physical state the size and the percentage distribution of the listed substance by activity. Do not include particles ≥10 microns in diameter. Measure the physical state and particle sizes for importing and processing activities at the time you import or begin to process the listed substance. Measure the physical state and particle sizes for manufacturing storage, disposal and transport activities using the final state of the product.

CBI

[ ]

Physical State		Manufacture	Import	Process	Store	Dispose	Transport
Dust	<1 micron						
	1 to <5 microns						
	5 to <10 microns						
Powder	<1 micron						
	1 to <5 microns						
	5 to <10 microns			N/A			
Fiber	<1 micron						
	1 to <5 microns						
	5 to <10 microns						
Aerosol	<1 micron						
	1 to <5 microns						
	5 to <10 microns						

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 5 ENVIRONMENTAL FATE

PART A RATE CONSTANTS AND TRANSFORMATION PRODUCTS

5.01 Indicate the rate constants for the following transformation processes.

a. Photolysis:

Absorption spectrum coefficient (peak) .... _____ (1/M cm) at _____ nm

Reaction quantum yield, ϕ ..... _____ at _____ nm

Direct photolysis rate constant, k_p, at ... _____ 1/hr _____ latitude

b. Oxidation constants at 25°C:

For $^1O_2$ (singlet oxygen), k_{ox} ..... _____ 1/M hr

For RO_2 (peroxy radical), k_{ox} ..... _____ 1/M hr

c. Five-day biochemical oxygen demand, BOD_5 ... _____ mg/l

d. Biotransformation rate constant:

For bacterial transformation in water, k_b... _____ 1/hr

Specify culture ..... _____

e. Hydrolysis rate constants:

For base-promoted process, k_B ..... _____ 1/M hr

For acid-promoted process, k_A ..... _____ 1/M hr

For neutral process, k_N ..... _____ 1/hr

f. Chemical reduction rate (specify conditions) _____

_____

g. Other (such as spontaneous degradation) ... _____

_____

[ ] Mark (X) this box if you attach a continuation sheet.

PART B PARTITION COEFFICIENTS

5.02 a. Specify the half-life of the listed substance in the following media.

Media	Half-life (specify units)
Groundwater	
Atmosphere	
Surface water	
Soil	

b. Identify the listed substance's known transformation products that have a half-life greater than 24 hours.

CAS No.	Name	Half-life (specify units)	Media
			in
			in
			in
			in

5.03 Specify the octanol-water partition coefficient, K_{ow} ... _____ at 25°C

Method of calculation or determination ..... _____

5.04 Specify the soil-water partition coefficient, K_d ..... _____ at 25°C

Soil type ..... _____

5.05 Specify the organic carbon-water partition coefficient, K_{oc} ..... _____ at 25°C

5.06 Specify the Henry's Law Constant, H ..... _____ atm-m^3/mole

[ ] Mark (X) this box if you attach a continuation sheet.

5.07 List the bioconcentration factor (BCF) of the listed substance, the species for which it was determined, and the type of test used in deriving the BCF.

Bioconcentration Factor	Species	Test[1]

[1]Use the following codes to designate the type of test:

F = Flowthrough
S = Static

[ ] Mark (X) this box if you attach a continuation sheet.

6.04 For each market listed below, state the quantity sold and the total sales value of
CBI the listed substance sold or transferred in bulk during the reporting year.

[ ]

Market	Quantity Sold or Transferred (kg/yr)	Total Sales Value ($/yr)
Retail sales	N/A	
Distribution -- Wholesalers		
Distribution -- Retailers		
Intra-company transfer		
Repackagers		
Mixture producers		
Article producers		
Other chemical manufacturers or processors		
Exporters		
Other (specify)		

6.05 Substitutes -- List all known commercially feasible substitutes that you know exist for the listed substance and state the cost of each substitute. A commercially feasible substitute is one which is economically and technologically feasible to use
CBI in your current operation, and which results in a final product with comparable performance in its end uses.

[ ]

Substitute	Cost ($/kg)
UNK	

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 7 MANUFACTURING AND PROCESSING INFORMATION

General Instructions:

For questions 7.04-7.06, provide a separate response for each process block flow diagram provided in questions 7.01, 7.02, and 7.03. Identify the process type from which the information is extracted.

PART A MANUFACTURING AND PROCESSING PROCESS TYPE DESCRIPTION

7.01 In accordance with the instructions, provide a process block flow diagram showing the major (greatest volume) process type involving the listed substance.

CBI

[ ] Process type ..... Batch

[X] Mark (X) this box if you attach a continuation sheet.

FLOW DIAGRAM GUIDE

1. ALL "A" SERIES TANKS ARE POLYOL

2. ALL "B" SERIES ARE PROCESS OIL TANKS

3. ALL "C" SERIES TANKS ARE TDI

4. ALL "D" SERIES TANKS ARE MDI

5. ALL "E" SERIES TANKS ARE GLUE/BINDER STORAGE TANKS

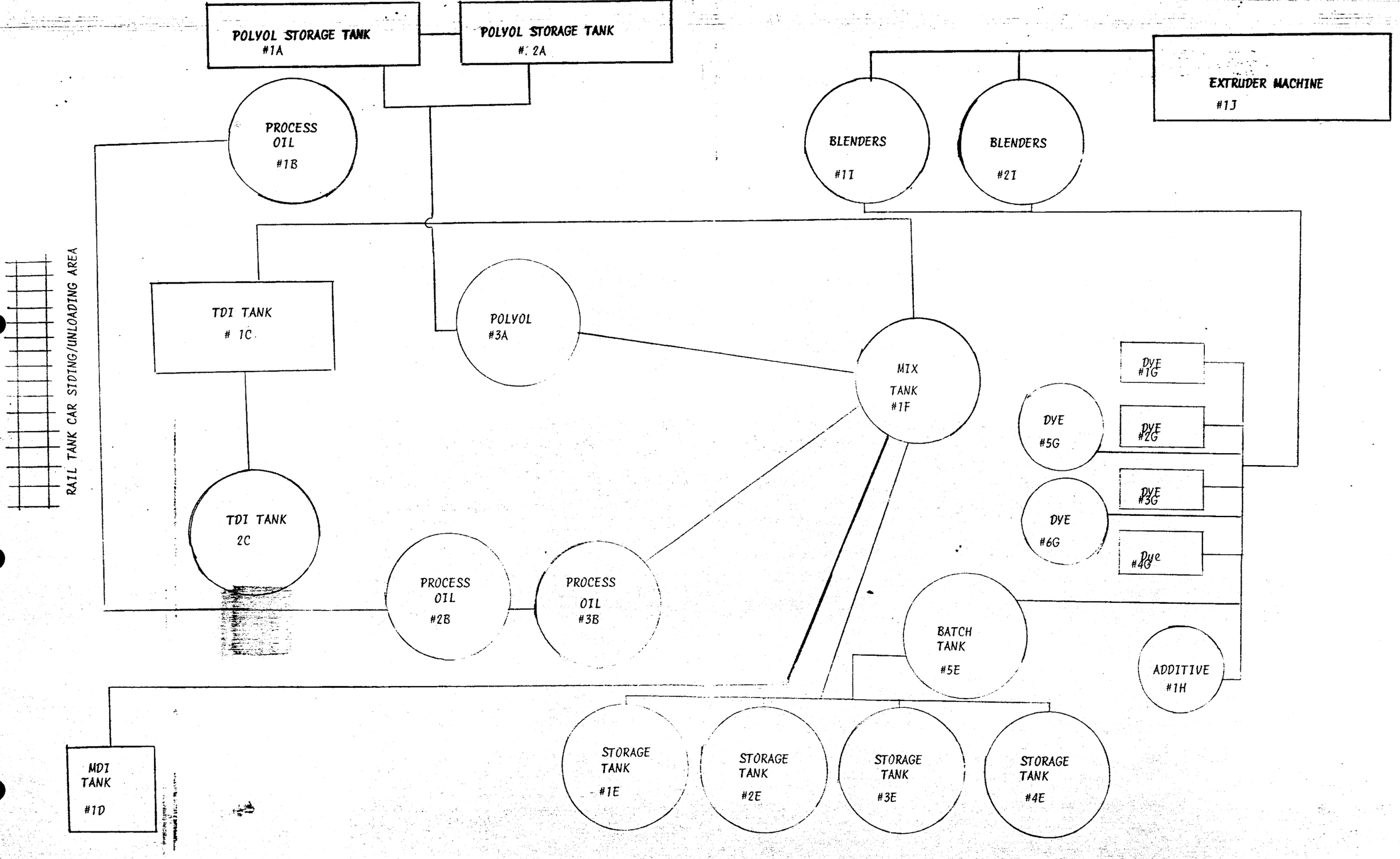
6. ALL "F" SERIES ARE MIXING TANKS

7. ALL "G" SERIES TANKS ARE DYE TANKS

8. ALL "H" SERIES TANKS ARE ADDITIVE TANKS(FIRE RETARDANT)

9. ALL "I" SERIES TANKS ARE BLENDERS

10. ITEM "J" IS THE EXTRUDER MACHINE


POLYOL STORAGE TANK
#1A
POLYOL STORAGE TANK
#2A
PROCESS
OIL
#1B
BLENDERS
#1I
BLENDERS
#2I
EXTRUDER MACHINE
#1J
RAIL TANK CAR SIDING/UNLOADING AREA
TDI TANK
1C
POLYOL
#3A
MIX
TANK
#1F
DYE
#1G
DYE
#5G
DYE
#2G
DYE
#3G
DYE
#6G
Dye
#4G
TDI TANK
2C
PROCESS
OIL
#2B
PROCESS
OIL
#3B
BATCH
TANK
#5E
ADDITIVE
#1H
MDI
TANK
#1D
STORAGE
TANK
#1E
STORAGE
TANK
#2E
STORAGE
TANK
#3E
STORAGE
TANK
#4E

7.03 In accordance with the instructions, provide a process block flow diagram showing all process emission streams and emission points that contain the listed substance and which, if combined, would total at least 90 percent of all facility emissions if not treated before emission into the environment. If all such emissions are released from one process type, provide a process block flow diagram using the instructions for question 7.01. If all such emissions are released from more than one process type, provide a process block flow diagram showing each process type as a separate block.

CBI

[ ] Process type ..... Batch

[X] Mark (X) this box if you attach a continuation sheet.

FLOW DIAGRAM GUIDE

1. ALL "A" SERIES TANKS ARE POLYOL

2. ALL "B" SERIES ARE PROCESS OIL TANKS

3. ALL "C" SERIES TANKS ARE TDI

4. ALL "D" SERIES TANKS ARE MDI

5. ALL "E" SERIES TANKS ARE GLUE/BINDER STORAGE TANKS

6. ALL "F" SERIES ARE MIXING TANKS

7. ALL "G" SERIES TANKS ARE DYE TANKS

8. ALL "H" SERIES TANKS ARE ADDITIVE TANKS(FIRE RETARDANT)

9. ALL "I" SERIES TANKS ARE BLENDERS

10. ITEM "J" IS THE EXTRUDER MACHINE

POLVOL STORAGE TANK #1A

POLVOL STORAGE TANK #2A

1A1

1A2

PROCESS OIL #1B

1B1

3A1

1C1

1C1

1C1

TDI TANK #1C

POLVOL #3A

4A1

4A1

MIX TANK #1F

1I1

1I2

BLENDERS #1I

BLENDERS #2I

EXTRUDER MACHINE #1J

VENT

VENT

VENT

VENT

1G7

1G7

1G7

DYE #1G

DYE #2G

DYE #5G

DYE #3G

DYE #6G

DYE #4G

1G1

1G2

1G5

1G3

1G6

1G4

1B3

1D1

1F1

1E5

BATCH TANK #5E

ADDITIVE #1H

1H1

TDI TANK 2C

1C2

1B1

1B1

PROCESS OIL #2B

1B2

PROCESS OIL #3B

1D1

1E1

1E2

1E3

1E4

STORAGE TANK #1E

STORAGE TANK #2E

STORAGE TANK #3E

STORAGE TANK #4E

MDI TANK #1D

RAIL TANK CAR SITING/UNLOADING AREA

7.04 Describe the typical equipment types for each unit operation identified in your process block flow diagram(s). If a process block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... Batch

Unit Operation ID Number	Typical Equipment Type	Operating Temperature Range (°C)	Operating Pressure Range (mm Hg)	Vessel Composition
1A - 3A	STORAGE TANK	°31 - °111		STEEL
1B - 3B	"			
1C - 2C	"			
1D	"			
1E - 5E	"			
1F	MIX TANK			
1G - 6G	DYE TANK			
1H	ADDITIVE TANK			
2I - 2I	BLENDERS	↓		↓
1J	EXTRUDER	N/A		Steel

[ ] Mark (X) this box if you attach a continuation sheet.

7.05 Describe each process stream identified in your process block flow diagram(s). If a process block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... Batch

Process Stream ID Code	Process Stream Description	Physical State[1]	Stream Flow (kg/yr)

[1]Use the following codes to designate the physical state for each process stream:

GC = Gas (condensible at ambient temperature and pressure)
GU = Gas (uncondensible at ambient temperature and pressure)
SO = Solid
SY = Sludge or slurry
AL = Aqueous liquid
OL = Organic liquid
IL = Immiscible liquid (specify phases, e.g., 90% water, 10% toluene)

☒ Mark (X) this box if you attach a continuation sheet.

FLOW DIAGRAM GUIDE

1. ALL "A" SERIES TANKS ARE POLYOL

2. ALL "B" SERIES ARE PROCESS OIL TANKS

3. ALL "C" SERIES TANKS ARE TDI

4. ALL "D" SERIES TANKS ARE MDI

5. ALL "E" SERIES TANKS ARE GLUE/BINDER STORAGE TANKS

6. ALL "F" SERIES ARE MIXING TANKS

7. ALL "G" SERIES TANKS ARE DYE TANKS

8. ALL "H" SERIES TANKS ARE ADDITIVE TANKS(FIRE RETARDANT)

9. ALL "I" SERIES TANKS ARE BLENDERS

10. ITEM "J" IS THE EXTRUDER MACHINE

POLYOL STORAGE TANK #1A

POLYOL STORAGE TANK #. 2A

1A1

1A2

1B1

PROCESS OIL #1B

3A1

1C1

1C1

1I1

1I2

EXTRUDER MACHINE #1J

VENT

BLENDERS #1I

BLENDERS #2I

VENT

VENT

VENT

1G7

1G7

1G7

TDI TANK # 1C

POLYOL #3A

4A1

4A1

1C1

MIX TANK #1F

1C2

1B3

1D1

1F1

DVE #1G

1G1

DVE #5G

DVE #2G

1G2

1G5

DVE #3G

1G3

1G6

DVE #6G

DYE #4G

1G4

TDI TANK 2C

1B1

1B1

PROCESS OIL #2B

1B2

PROCESS OIL #3B

1E5

BATCH TANK #5E

ADDITIVE #1H

1H1

1D1

1E1

1E2

1E3

1E4

STORAGE TANK #1E

STORAGE TANK #2E

STORAGE TANK #3E

STORAGE TANK #4E

MDI TANK #1D

RAIL TANK CAR SIDING/UNLOADING AREA

7.06 Characterize each process stream identified in your process block flow diagram(s). If a process block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the CBI instructions for further explanation and an example.)

[ ] Process type ..... _____

a. Process Stream ID Code	b. Known Compounds[1]	c. Concentrations[2,3] (% or ppm)	d. Other Expected Compounds	e. Estimated Concentrations (% or ppm)
	N/A			

7.06 continued below

[ ] Mark (X) this box if you attach a continuation sheet.

FLOW DIAGRAM GUIDE

1. ALL "A" SERIES TANKS ARE POLYOL

2. ALL "B" SERIES ARE PROCESS OIL TANKS

3. ALL "C" SERIES TANKS ARE TDI

4. ALL "D" SERIES TANKS ARE MDI

5. ALL "E" SERIES TANKS ARE GLUE/BINDER STORAGE TANKS

6. ALL "F" SERIES ARE MIXING TANKS

7. ALL "G" SERIES TANKS ARE DYE TANKS

8. ALL "H" SERIES TANKS ARE ADDITIVE TANKS(FIRE RETARDANT)

9. ALL "I" SERIES TANKS ARE BLENDERS

10. ITEM "J" IS THE EXTRUDER MACHINE

POLYOL STORAGE TANK #1A

POLYOL STORAGE TANK #2A

1A1

1A2

PROCESS OIL #1B

1B1

3A1

1C1

1C1

1C1

VENT

BLENDERS #1I

1I1

BLENDERS #2I

1I2

VENT

EXTRUDER MACHINE #1J

VENT

VENT

1G7

1G7

1G7

TDI TANK # 1C

POLYOL #3A

4A1

4A1

MIX TANK #1F

1C2

1B3

1D1

1F1

DYE #1G

1G1

DYE #5G

DYE #2G

1G2

1G5

DYE #3G

1G3

1G6

DYE #6G

DYE #4G

1G4

TDI TANK 2C

1B1

1B1

PROCESS OIL #2B

1B2

PROCESS OIL #3B

1E5

BATCH TANK #5E

ADDITIVE #1H

1H1

1D1

1E1

1E2

1E3

1E4

MDI TANK #1D

STORAGE TANK #1E

STORAGE TANK #2E

STORAGE TANK #3E

STORAGE TANK #4E

RAIL TANK CAR SIDING/UNLOADING AREA

7.06 (continued)

[1]For each additive package introduced into a process stream, specify the compounds that are present in each additive package, and the concentration of each component. Assign an additive package number to each additive package and list this number in column b. (Refer to the instructions for further explanation and an example. Refer to the glossary for the definition of additive package.)

Additive Package Number	Components of Additive Package	Concentrations (% or ppm)
1		
2		
3		
4		
5		

[2]Use the following codes to designate how the concentration was determined:

A = Analytical result
E = Engineering judgement/calculation

[3]Use the following codes to designate how the concentration was measured:

V = Volume
W = Weight

[ ] Mark (X) this box if you attach a continuation sheet.

PART A RESIDUAL TREATMENT PROCESS DESCRIPTION

8.01 In accordance with the instructions, provide a residual treatment block flow diagram which describes the treatment process used for residuals identified in question 7.01.

CBI

[ ] Process type ..... N/A

[ ] Mark (X) this box if you attach a continuation sheet.

PART B RESIDUAL GENERATION AND CHARACTERIZATION

8.05 Characterize each process stream identified in your residual treatment block flow diagram(s). If a residual treatment block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the instructions for further explanation and an example.)

CBI

[ ] Process type ....

a. Stream ID Code	b. Type of Hazardous Waste[1]	c. Physical State of Residual[2]	d. Known Compounds[3]	e. Concentrations (% or ppm)[4,5,6]	f. Other Expected Compounds	g. Estimated Concentrations (% or ppm)
NA	NA					

8.05 continued below

[ ] Mark (X) this box if you attach a continuation sheet.

8.05 (continued)

[1]Use the following codes to designate the type of hazardous waste:

I = Ignitable
C = Corrosive
R = Reactive
E = EP toxic
T = Toxic
H = Acutely hazardous

[2]Use the following codes to designate the physical state of the residual:

GC = Gas (condensible at ambient temperature and pressure)
GU = Gas (uncondensible at ambient temperature and pressure)
SO = Solid
SY = Sludge or slurry
AL = Aqueous liquid
OL = Organic liquid
IL = Immiscible liquid (specify phases, e.g., 90% water, 10% toluene)

8.05 continued below

[ ] Mark (X) this box if you attach a continuation sheet.

8.05 (continued)

[3]For each additive package introduced into a process stream, specify the compounds that are present in each additive package, and the concentration of each component. Assign an additive package number to each additive package and list this number in column d. (Refer to the instructions for further explanation and an example. Refer to the glossary for the definition of additive package.)

Additive Package Number	Components of Additive Package	Concentrations (% or ppm)
1	N/A	
2		
3		
4		
5		

[4]Use the following codes to designate how the concentration was determined:

A = Analytical result
E = Engineering judgement/calculation

8.05 continued below

[ ] Mark (X) this box if you attach a continuation sheet.

8.05 (continued)

[5]Use the following codes to designate how the concentration was measured:

V = Volume
W = Weight

[6]Specify the analytical test methods used and their detection limits in the table below. Assign a code to each test method used and list those codes in column e.

Code	Method	Detection Limit (± ug/l)
1	N/A	
2		
3		
4		
5		
6		

[ ] Mark (X) this box if you attach a continuation sheet.

8.06 Characterize each process stream identified in your residual treatment block flow diagram(s). If a residual treatment block flow diagram is provided for more than one process type, photocopy this question and complete it separately for each process type. (Refer to the instructions for further explanation and an example.)

CBI

[ ] Process type ..... _____

a. Stream ID Code	b. Waste Description Code[1]	c. Management Method Code[2]	d. Residual Quantities (kg/yr)	e. Management of Residual (%) On-Site	e. Management of Residual (%) Off-Site	f. Costs for Off-Site Management (per kg)	g. Changes in Management Methods
N/A							

[1]Use the codes provided in Exhibit 8-1 to designate the waste descriptions

[2]Use the codes provided in Exhibit 8-2 to designate the management methods

[ ] Mark (X) this box if you attach a continuation sheet.

8.22 Describe the combustion chamber design parameters for each of the three largest (by capacity) incinerators that are used on-site to burn the residuals identified in
CBI your process block or residual treatment block flow diagram(s).

[ ]

Incinerator	Combustion Chamber Temperature (°C)		Location of Temperature Monitor		Residence Time In Combustion Chamber (seconds)	
	Primary	Secondary	Primary	Secondary	Primary	Secondary
1						
2						
3						

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

8.23 Complete the following table for the three largest (by capacity) incinerators that are used on-site to burn the residuals identified in your process block or residual
CBI treatment block flow diagram(s).

[ ]

Incinerator	Air Pollution Control Device[1]	Types of Emissions Data Available
1		
2		
3		

Indicate if Office of Solid Waste survey has been submitted in lieu of response by circling the appropriate response.

Yes 1

No 2

---

[1] Use the following codes to designate the air pollution control device:

S = Scrubber (include type of scrubber in parenthesis)
E = Electrostatic precipitator
O = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

PART A EMPLOYMENT AND POTENTIAL EXPOSURE PROFILE

9.01 Mark (X) the appropriate column to indicate whether your company maintains records on the following data elements for hourly and salaried workers. Specify for each data element the year in which you began maintaining records and the number of years the records for that data element are maintained. (Refer to the instructions for further explanation and an example.)

CBI

[ ]

Data Element	Data are Maintained for: Hourly Workers	Salaried Workers	Year in Which Data Collection Began	Number of Years Records Are Maintained
Date of hire	X	X	WHEN HIRED	5
Age at hire	X	X	ON FILE	5
Work history of individual before employment at your facility	X	X	APPLICATION	5
Sex	X	X	"	5
Race	X	X	"	5
Job titles	X	X	ON FILE	5
Start date for each job title	X	X	WHEN ASSIGNED	5
End date for each job title	X	X	ON FILE	5
Work area industrial hygiene monitoring data	X	X	1979	30
Personal employee monitoring data	X	X	1979	30
Employee medical history	X	X	WHEN ASSIGNED	30
Employee smoking history	NO	NO	N/A	NO
Accident history	X	X	ON FILE	5
Retirement date	NO	NO	N/A	NO
Termination date	X	X	WHEN TERMINATED	5
Vital status of retirees	NO	NO	N/A	NONE
Cause of death data	NO	NO	NO	NONE

[ ] Mark (X) this box if you attach a continuation sheet.

9.02 In accordance with the instructions, complete the following table for each activity in which you engage.

CBI

[ ]

	a. Activity	b. Process Category	c. Yearly Quantity (kg)	d. Total Workers	e. Total Worker-Hours
	Manufacture of the listed substance	Enclosed	N/A		
		Controlled Release			
		Open			
X	On-site use as reactant	Enclosed			
		Controlled Release			
		Open			
	On-site use as nonreactant	Enclosed			
		Controlled Release			
		Open			
	On-site preparation of products	Enclosed			
		Controlled Release			
		Open			

[ ] Mark (X) this box if you attach a continuation sheet.

9.03 Provide a descriptive job title for each labor category at your facility that encompasses workers who may potentially come in contact with or be exposed to the listed substance.

CBI

[ ]

Labor Category	Descriptive Job Title
A	Supervisor (2) 556.130-010
B	Extruder Oper (2) 557.382-010
C	Extruder Helper (Blue Rm) 557.564-010
D	Maintenance Repair (6) 889.281-014
E	
F	
G	
H	
I	
J	

[ ] Mark (X) this box if you attach a continuation sheet.

9.04 In accordance with the instructions, provide your process block flow diagram(s) and indicate associated work areas.

CBI

[ ] Process type ..... Batch

[ ] Mark (X) this box if you attach a continuation sheet.

9.05 Describe the various work area(s) shown in question 9.04 that encompass workers who may potentially come in contact with or be exposed to the listed substance. Add any additional areas not shown in the process block flow diagram in question 7.01 or 7.02. Photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... _____

Work Area ID	Description of Work Areas and Worker Activities
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

[ ] Mark (X) this box if you attach a continuation sheet.

9.06 Complete the following table for each work area identified in question 9.05, and for each labor category at your facility that encompasses workers who may potentially come in contact with or be exposed to the listed substance. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... BATCH

Work area .....

Labor Category	Number of Workers Exposed	Mode of Exposure (e.g., direct skin contact)	Physical State of Listed Substance[1]	Average Length of Exposure Per Day[2]	Number of Days per Year Exposed
A	1	INHALATION/SKIN CONTACT	GU/OL	B	
B	2	INHALATION	GU	F	
C	2	INHALATION	GU	B	
D	6	INHALATION/SKIN CONTACT	GU/OL		

[1]Use the following codes to designate the physical state of the listed substance at the point of exposure:

GC = Gas (condensible at ambient temperature and pressure)
GU = Gas (uncondensible at ambient temperature and pressure; includes fumes, vapors, etc.)
SO = Solid
SY = Sludge or slurry
AL = Aqueous liquid
OL = Organic liquid
IL = Immiscible liquid (specify phases, e.g., 90% water, 10% toluene)

[2]Use the following codes to designate average length of exposure per day:

A = 15 minutes or less
B = Greater than 15 minutes, but not exceeding 1 hour
C = Greater than one hour, but not exceeding 2 hours
D = Greater than 2 hours, but not exceeding 4 hours
E = Greater than 4 hours, but not exceeding 8 hours
F = Greater than 8 hours

[ ] Mark (X) this box if you attach a continuation sheet.

THE DOW CHEMICAL COMPANY

INDUSTRIAL HYGIENE REPORT

DATE December 6, 1988

INDUSTRIAL HYGIENE SURVEY OF EQUIPMENT EMISSIONS AND EMPLOYEES' EXPOSURES TO AIRBORNE TOLUENE DIISOCYANATE (TDI) DURING POLYURETHANE FOAM REBOND MOLDING OPERATIONS AT MPI INCORPORATED, HOUSTON, MISSISSIPPI, JULY 25, 1988

FOR J. P. Cikalo
Industrial Hygiene Laboratory
Health & Environmental Sciences

DISTRIBUTION W. B. Volpe, Dow Chemical USA
Charlotte, North Carolina

SUMMARY

An industrial hygiene survey was conducted on July 25, 1988, at MPI Incorporated, Houston, Mississippi, to assess equipment emission levels and employee exposures to toluene diisocyanate (TDI) during rebond molding operations.

TDI emissions monitored near process equipment ranged from 0.032 to greater than 0.500 ppm. These measurements were of localized concentrations and do not represent employees' breathing zone concentrations.

Peak personal TDI exposure concentrations for the Tower Operator (who was the only employee working in the process area) ranged from 0.001 - 0.008 ppm during the two hour sampling period. His two-hour time-weighted average (TWA) exposure was 0.003 ppm.

Area TDI concentrations in the glue room ranged from 0.005 - 0.010 ppm.

The applicable Occupational Safety and Health Act (OSHA) Permissible Exposure Limit (PEL) for TDI is 0.02 ppm as a ceiling limit. The Threshold Limit Value (TLV) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) is 0.005 ppm as an 8-hour TWA exposure and a Short Term Exposure Limit (STEL) of 0.02 ppm.

PURPOSE

An industrial hygiene survey was conducted as a service to MPI Incorporated, Houston, Mississippi, in support of products manufactured by the Dow Chemical Company. The primary purpose of this survey was to assess equipment emissions and employees' exposures to airborne toluene diisocyanate (TDI) during rebond molding operations.

CONCLUSIONS

The following conclusions are based on conditions that existed on the day of the survey, July 25, 1988. Changes in work habits, operating procedures or equipment may invalidate these conclusions.

The applicable OSHA Permissible Exposure Limit (PEL) for TDI is 0.02 ppm as a ceiling limit. The Threshold Limit Value (TLV) recommended by ACGIH is 0.005 ppm as an 8-hour TWA exposure and a Short Term Exposure Limit (STEL) of 0.02 ppm.

1). Area TDI concentrations near the "tub" at the extruder head ranged from 0.032 ppm to greater than 0.500 ppm (the upper limit of quantitation for the monitoring equipment). TDI measurements above the feed screw at #1 blender ranged from 0.019 - 0.375 ppm, and from 0.072 to greater than 0.500 ppm above the feed screw at #2 blender. These measurements were of localized concentrations and do not represent employees' breathing zone concentrations.

2). Peak personal TDI exposure concentrations for the Tower Operator (who was the only employee working in the process area) ranged from 0.001 - 0.008 ppm during the two hour sampling period. The two-hour time-weighted average (TWA) exposure for this individual was 0.003 ppm.

3). Area TDI concentrations in the glue room ranged from 0.005 - 0.010 ppm.

EXPOSURE EVALUATION CRITERIA

The health standards for limiting employee exposure to airborne contaminants, established as a result of the Occupational Safety and Health Act (OSHA), became effective in 1971. These standards are known as Permissible Exposure Limits (PEL), and the law requires compliance with them.

Other exposure criteria, known as the Threshold Limit Values (TLV), have been established by the American Conference of Governmental Industrial Hygienists (ACGIH), and are not law but rather are recommended guidelines prepared by an internationally-recognized advisory group of governmental and academic health professionals.

Most OSHA PEL's and ACGIH TLV's represent time-weighted average (TWA) concentrations to which it is believed most members of a working population may be exposed during an 8-hour day, 40-hour week, for a working lifetime without adverse health effects.

Because these criteria are TWA values, short-term exposures to high concentrations are acceptable for many materials as long as the 8-hour TWA exposure does not exceed the exposure criterion. To prevent potential effects from short exposures to relatively high concentrations of a substance, short-term exposure limits (STEL's) have been developed for many materials which have TLV's.

In some cases, OSHA standards and ACGIH criteria may identify ceiling (C) exposure limits indicating that exposures should not exceed that level even for short periods of time.

The current applicable OSHA Permissible Exposure Limit (PEL) for toluene-2,4-diisocyanate (TDI) is 0.02 ppm as a ceiling limit.

In 1983 the ACGIH adopted a TLV of 0.005 ppm as an 8-hour TWA exposure and 0.02 ppm TDI as a STEL. ACGIH currently defines a STEL as a 15-minute exposure which should not be exceeded at any time during a work day, even if the 8-hour TWA exposure is below the TLV.

It should be noted that the National Institute for Occupational Safety and Health (NIOSH) in September 1978, presented to the Occupational Safety and Health Administration, for regulatory consideration, a recommended standard for diisocyanates, including TDI. NIOSH recommended a TWA exposure guideline of 0.005 ppm for a 10-hour workday and a 10-minute ceiling limit of 0.02 ppm. At this time, the Occupational Safety and Health Administration has taken no action with regard to NIOSH's recommendation.

To achieve compliance with the OSHA standards, the law requires that "... administrative or engineering controls must first be determined and implemented whenever feasible..." [29CFR1910.1000(e)]. The most desirable way to reduce airborne contaminant levels is through engineering controls such as supplying adequate ventilation, including local exhaust systems. Administrative control invloves changing the employees' exposures by assigning different or rotating work duties. When engineering or

administrative controls are not feasible, respirators and other personal protective equipment may be used to achieve compliance with OSHA standards. The use of such equipment must comply with OSHA regulations 29CFR1910.132 through 1910.140.

TOXIC PROPERTIES

Toluene-2,4-Diisocyanate (TDI) is a respiratory irritant, capable of producing nasal irritation, nasal congestion, dry throat, and headache. The most serious toxicologic action is the potential for allergic sensitization of the respiratory tract in man. Sensitization may result from a single high exposure or from repeated excessive exposures. Once sensitized, individuals respond to extremely low level exposures with an allergic response characterized by asthma-like breathing, coughing spasms, and cyanosis.

Nonsensitized individuals may experience similar reactions from a single high exposure. The reaction may be delayed several hours after exposure and frequently occurs during nocturnal hours.

Persons with a medical history of chronic respiratory disease or respiratory allergies should not be exposed to TDI.

TDI is also a severe skin and eye irritant. Skin sensitization has been produced in humans whose respiratory tracts were protected by airline respirators but who had repeated skin contact.

SAMPLING AND ANALYTICAL METHODS

Area concentrations and personal exposure levels of TDI were evaluated by instrumental procedures using GMD Systems Inc., Personal Continuous Monitors (PCM 600-60). This instrument draws a metered volume of air through a chemically impregnated paper tape and if TDI is present, a color develops on the tape. The intensity of the color is measured optically and is proportional to the concentration of TDI.

The GMD Systems PCM 600-60 consists of two main components; a Chest Pack and a Belt Pack. When the PCM 600-60 is used as a personal monitor, the Chest Pack, is worn below the face and the Belt Pack is worn at the waist. When used as an area monitor, the two components are mounted in a stationary location. The Chest Pack contains a miniaturized paper tape cassette, tape transport, and optics andthe Belt Pack contains a pump, digital microprocessor circuitry, and a rechargeable battery.

The PCM takes an air sample of four minutes' duration if levels are approximately 0.02 ppm TDI or less. If concentrations exceed 0.02 ppm, the sampling period will shorten, resulting in a more rapid tape advance and a more detailed characterization of excursion exposures. The lower detection limit of the PCM for TDI is approximately 0.001 ppm and the upper quantitation limit is around 0.5 ppm. Data are stored in the PCM's memory and passed to a computer for analysis via a separate computer interface compatible with IBM PC's and other similar personal computers. The data can be presented to include individual data ponts during a run, time-weighted average (TWA) exposure values for the monitoring period, 8-hour TWA values, the highest measured TDI concentration, and the number of excursion values exceeding 0.02 ppm during the period of monitoring.

Although the data obtained by PCM 600-60 monitors do not meet the strictest definition of a ceiling limit, i.e. the concentration that should not be exceeded instantaneously, the data are comparable to those obtained by other current TDI monitoring methods. For example, the NIOSH Method P&CAM 141 (1), the so-called Marcali Method, specifies a 20-minute sampling period and thus results from this method represent 20-minute TWA concentrations, compared to the 4-minute TWA concentrations measured with the PCM 600-60. NIOSH, after evaluating a competitive paper tape personal monitor, the MDA/MCM-4000, had concluded: "...considering the accuracy of the TWA measurements, the capability of indicating the exposure profiles and the versatility and simplicity of the paper tape monitors, we feel the paper tape personal monitors are the best method currently available for environmental characterization of TDI for long term epidemiologic studies."(2)

PROCESS DESCRIPTION

The rebond molding process at MPI Inc., Houston, Mississippi, begins by mixing foam chips with prepolymer (containing TDI) in blenders. Following a designated period of mixing, the contents of each blender are dumped to the "tub" where a screw conveyer transports the material to the extruder. During the "dump", unreacted TDI vapors can be released through various openings in the conveyer system. In the extruder, the foam-polymer mixture is compressed and heated on a conveyer line to form a continuous "bun". The Tower Operator who oversees the operation, works inside of a control booth during his entire ten-hour shift.

SURVEY RESULTS AND DISCUSSION

Table 1 summarizes the results of personal exposure measurements for TDI. The Tower Operator, who was the only employee in the process area, had peak personal exposure measurements ranging from 0.001 ppm to 0.008 ppm.

His time-weighted average (TWA) exposure for the two-hour sampling period was 0.003 ppm.

Table 2 summarizes the results of equipment emissions and area monitoring. The highest TDI emissions concentrations were above the feed screw at blender #2 (0.072 to greater than 0.500 ppm), and near the "tub" at the extruder head (0.032 to greater than 0.500 ppm). Emissions above the feed screw at blender #1 ranged from 0.019 - 0.375 ppm. These measurements were of localized concentrations and do not represent employees' breathing zone concentrations.

Area concentration measurements taken in the glue room ranged from 0.005 - 0.010 ppm.

REFERENCES

1. Taylor, D. B.: National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods, Method No. P&CAM 141, Volume 1, 2nd Edition, DHEW (NIOSH) Publication Number 77-157-A, U.S. Department of Health, Education and Welfare, 1977.

2. Weil, H., et. al.: Respiratory and Immunologic Evaluation of Isocyanate Exposure in a New Manufacturing Plant, page 46, DHHS (NIOSH) Publication Number 81-125, U.S. Department of Health and Human Services, 1981.

NOTICE

The information and any recommendations contained herein are presented in good faith. However, no guarantee of accuracy or completeness is given. Data presented are believed factual unless otherwise indicated, but conclusions based on such data will not be valid if observed operations change. No representation is made that all existing or potential problems have been identified, or that recommendations made will solve the problem, or that laws or regulations will be construed by government agencies consistent with our understanding of them.

Signature: John Cikalo (Author)

Date: Dec. 12/88

Signature: D. W. Engdahl (Reviewer)

Date: December 12, 1988

dlg

Table 1: RESULTS OF PERSONAL MONITORING FOR AIRBORNE TOLUENE DIISOCYANATE (TDI) DURING POLYURETHANE FOAMREBOND MOLDING OPERATIONS AT MPI INCORPORATED, ECHOTA, GEORGIA, JULY 26, 1988

Job Function	Sample Time (min.)	TDI Concentration, ppm (vol/vol)	
		Range	Average
Tower Operator (W. Bevills)	119	0.001 - 0.008	0.003

OSHA Permissible Exposure Limit (PEL) for TDI is 0.02 ppm as a ceiling limit. The ACGIH Threshold Limit Value is 0.005 ppm for an 8-hour Time-Weighted Average (TWA) and the Short Term Exposure Limit (STEL) is 0.020 ppm.

Table 2: RESULTS OF AREA AND EQUIPMENT EMISSIONS MONITORING FOR AIRBORNE TOLUENE DIISOCYANATE (TDI) DURING POLYURETHANE FOAM REBOND MOLDING OPERATIONS AT MPI INCORPORATED, HOUSTON, MISSISSIPPI, JULY 25, 1988

Sample Location	Sample Time (min.)	TDI Concentration, ppm (vol/vol)	
		Range	Average
1) Glue room	111	0.005 - 0.010	0.008
2) "Tub" at extruder head	43	0.032 - >0.500*	0.127*
3) #1 Blender -above feed screw	113	0.019 - 0.375*	0.072*
4) #2 Blender -above feed screw	34	0.072 - >0.500*	0.255*

*These measurements are of equipment emissions only and do not represent potential breathing zone concentrations.

OSHA Permissible Exposure Limit (PEL) for TDI is 0.02 ppm as a ceiling limit. The ACGIH Threshold Limit Value is 0.005 ppm for an 8-hour Time-Weighted Average (TWA) and the Short Term Exposure Limit (STEL) is 0.020 ppm.

ADDENDUM

1. Code of Federal Regulations: Title 29, Section 1910.1000, Subpart Z, Toxic and Hazardous Substances.

9.07 For each labor category represented in question 9.06, indicate the 8-hour Time Weighted Average (TWA) exposure levels and the 15-minute peak exposure levels. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... Batch

Work area .....

Labor Category	8-hour TWA Exposure Level (ppm, mg/m^3, other-specify)	15-Minute Peak Exposure Level (ppm, mg/m^3, other-specify)
	UNKNOWN	UNKNOWN

[X] Mark (X) this box if you attach a continuation sheet.

PART B WORK PLACE MONITORING PROGRAM

9.08 If you monitor worker exposure to the listed substance, complete the following table.

CBI

[ ]

Sample/Test	Work Area ID	Testing Frequency (per year)	Number of Samples (per test)	Who Samples[1]	Analyzed In-House (Y/N)	Number of Years Records Maintained
Personal breathing zone	N/A					
General work area (air)						
Wipe samples						
Adhesive patches						
Blood samples						
Urine samples						
Respiratory samples						
Allergy tests						
Other (specify) _____						
Other (specify) _____						
Other (specify) _____						

[1]Use the following codes to designate who takes the monitoring samples:

A = Plant industrial hygienist
B = Insurance carrier
C = OSHA consultant
D = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

9.09 For each sample type identified in question 9.08, describe the type of sampling and analytical methodology used for each type of sample.

CBI

[ ]	Sample Type	Sampling and Analytical Methodology
	See ATTACHED	INDUSTRIAL HYGIENE REPORT

9.10 If you conduct personal and/or ambient air monitoring for the listed substance, specify the following information for each equipment type used.

CBI

[ ]	Equipment Type[1]	Detection Limit[2]	Manufacturer	Averaging Time (hr)	Model Number

[1]Use the following codes to designate personal air monitoring equipment types:

A = Passive dosimeter
B = Detector tube
C = Charcoal filtration tube with pump
D = Other (specify) _____

Use the following codes to designate ambient air monitoring equipment types:

E = Stationary monitors located within work area
F = Stationary monitors located within facility
G = Stationary monitors located at plant boundary
H = Mobile monitoring equipment (specify) _____
I = Other (specify) _____

[2]Use the following codes to designate detection limit units:

A = ppm
B = Fibers/cubic centimeter (f/cc)
C = Micrograms/cubic meter (μ/m^3)

[ ] Mark (X) this box if you attach a continuation sheet.

9.11 If you conduct routine medical tests for monitoring the health effects of exposure to the listed substance, specify the type and frequency of the tests.

CBI

[ ]	Test Description	Frequency (weekly, monthly, yearly, etc.)
	SEE ATTACHED REPORT	

[ ] Mark (X) this box if you attach a continuation sheet.

THE DOW CHEMICAL COMPANY

INDUSTRIAL HYGIENE REPORT

DATE December 6, 1988

INDUSTRIAL HYGIENE SURVEY OF EQUIPMENT EMISSIONS AND EMPLOYEES' EXPOSURES TO AIRBORNE TOLUENE DIISOCYANATE (TDI) DURING POLYURETHANE FOAM REBOND MOLDING OPERATIONS AT MPI INCORPORATED, HOUSTON, MISSISSIPPI, JULY 25, 1988

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PURPOSE

An industrial hygiene survey was conducted as a service to MPI Incorporated, Houston, Mississippi, in support of products manufactured by the Dow Chemical Company. The primary purpose of this survey was to assess equipment emissions and employees' exposures to airborne toluene diisocyanate (TDI) during rebond molding operations.

CONCLUSIONS

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Table 1 summarizes the results of personal exposure measurements for TDI. The Tower Operator, who was the only employee in the process area, had peak personal exposure measurements ranging from 0.001 ppm to 0.008 ppm.

His time-weighted average (TWA) exposure for the two-hour sampling period was 0.003 ppm.

Table 2 summarizes the results of equipment emissions and area monitoring. The highest TDI emissions concentrations were above the feed screw at blender #2 (0.072 to greater than 0.500 ppm), and near the "tub" at the extruder head (0.032 to greater than 0.500 ppm). Emissions above the feed screw at blender #1 ranged from 0.019 - 0.375 ppm. These measurements were of localized concentrations and do not represent employees' breathing zone concentrations.

Area concentration measurements taken in the glue room ranged from 0.005 - 0.010 ppm.

REFERENCES

1. Taylor, D. B.: National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods, Method No. P&CAM 141, Volume 1, 2nd Edition, DHEW (NIOSH) Publication Number 77-157-A, U.S. Department of Health, Education and Welfare, 1977.

2. Weil, H., et. al.: Respiratory and Immunologic Evaluation of Isocyanate Exposure in a New Manufacturing Plant, page 46, DHHS (NIOSH) Publication Number 81-125, U.S. Department of Health and Human Services, 1981.

NOTICE

The information and any recommendations contained herein are presented in good faith. However, no guarantee of accuracy or completeness is given. Data presented are believed factual unless otherwise indicated, but conclusions based on such data will not be valid if observed operations change. No representation is made that all existing or potential problems have been identified, or that recommendations made will solve the problem, or that laws or regulations will be construed by government agencies consistent with our understanding of them.

Signature: John Cikalo (Author)

Date: Dec. 12/88

Signature: J. W. Ingdahl (Reviewer)

Date: December 12, 1988

dlg

Table 1: RESULTS OF PERSONAL MONITORING FOR AIRBORNE TOLUENE DIISOCYANATE (TDI) DURING POLYURETHANE FOAMREBOND MOLDING OPERATIONS AT MPI INCORPORATED, ECHOTA, GEORGIA, JULY 26, 1988

Job Function	Sample Time (min.)	TDI Concentration, ppm (vol/vol)	
		Range	Average
Tower Operator (W. Bevills)	119	0.001 - 0.008	0.003

OSHA Permissible Exposure Limit (PEL) for TDI is 0.02 ppm as a ceiling limit. The ACGIH Threshold Limit Value is 0.005 ppm for an 8-hour Time-Weighted Average (TWA) and the Short Term Exposure Limit (STEL) is 0.020 ppm.

Table 2: RESULTS OF AREA AND EQUIPMENT EMISSIONS MONITORING FOR AIRBORNE TOLUENE DIISOCYANATE (TDI) DURING POLYURETHANE FOAM REBOND MOLDING OPERATIONS AT MPI INCORPORATED, HOUSTON, MISSISSIPPI, JULY 25, 1988

Sample Location	Sample Time (min.)	TDI Concentration, ppm (vol/vol)	
		Range	Average
1) Glue room	111	0.005 - 0.010	0.008
2) "Tub" at extruder head	43	0.032 - >0.500*	0.127*
3) #1 Blender -above feed screw	113	0.019 - 0.375*	0.072*
4) #2 Blender -above feed screw	34	0.072 - >0.500*	0.255*

*These measurements are of equipment emissions only and do not represent potential breathing zone concentrations.

OSHA Permissible Exposure Limit (PEL) for TDI is 0.02 ppm as a ceiling limit. The ACGIH Threshold Limit Value is 0.005 ppm for an 8-hour Time-Weighted Average (TWA) and the Short Term Exposure Limit (STEL) is 0.020 ppm.

ADDENDUM

1. Code of Federal Regulations: Title 29, Section 1910.1000, Subpart Z, Toxic and Hazardous Substances.

PART C ENGINEERING CONTROLS

9.12 Describe the engineering controls that you use to reduce or eliminate worker exposure to the listed substance. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... Batch

Work area ..... Glue Room

Engineering Controls	Used (Y/N)	Year Installed	Upgraded (Y/N)	Year Upgraded
Ventilation:				
Local exhaust	Y			
General dilution	N			
Other (specify)				
Vessel emission controls	Y			
Mechanical loading or packaging equipment	N/A			
Other (specify)				

[ ] Mark (X) this box if you attach a continuation sheet.

9.13 Describe all equipment or process modifications you have made within the 3 years prior to the reporting year that have resulted in a reduction of worker exposure to the listed substance. For each equipment or process modification described, state the percentage reduction in exposure that resulted. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... See attached Report

Work area .....

Equipment or Process Modification	Reduction in Worker Exposure Per Year (%)

[ ] Mark (X) this box if you attach a continuation sheet.

PART D PERSONAL PROTECTIVE AND SAFETY EQUIPMENT

9.14 Describe the personal protective and safety equipment that your workers wear or use in each work area in order to reduce or eliminate their exposure to the listed substance. Photocopy this question and complete it separately for each process type and work area.

CBI

[ ] Process type ..... BATCH

Work area ..... GLUE ROOM

Equipment Types	Wear or Use (Y/N)
Respirators	Y
Safety goggles/glasses	Y
Face shields	N
Coveralls	Y
Bib aprons	Y
Chemical-resistant gloves	Y
Other (specify)	
_____	_____
_____	_____

[ ] Mark (X) this box if you attach a continuation sheet.

9.15 If workers use respirators when working with the listed substance, specify for each process type, the work areas where the respirators are used, the type of respirators used, the average usage, whether or not the respirators were fit tested, and the type and frequency of the fit tests. Photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... Batch

Work Area	Respirator Type	Average Usage[1]	Fit Tested (Y/N)	Type of Fit Test[2]	Frequency of Fit Tests (per year)
1	HALF MASK	A	Y	QL	D

[1]Use the following codes to designate average usage:

A = Daily
B = Weekly
C = Monthly
D = Once a year
E = Other (specify) _____

[2]Use the following codes to designate the type of fit test:

QL = Qualitative
QT = Quantitative

[ ] Mark (X) this box if you attach a continuation sheet.

PART E WORK PRACTICES

9.19 Describe all of the work practices and administrative controls used to reduce or eliminate worker exposure to the listed substance (e.g., restrict entrance only to authorized workers, mark areas with warning signs, insure worker detection and monitoring practices, provide worker training programs, etc.). Photocopy this question and complete it separately for each process type and work area.

CBI

[ ]

Process type ..... BATCH

Work area ..... GLUE ROOM (1)

RESTRICTED ENTRANCE, WARNING SIGNS, WORKER TRAINING, PLANT MEMO'S

9.20 Indicate (X) how often you perform each housekeeping task used to clean up routine leaks or spills of the listed substance. Photocopy this question and complete it separately for each process type and work area.

Process type ..... BATCH

Work area ..... GLUE ROOM (1)

Housekeeping Tasks	Less Than Once Per Day	1-2 Times Per Day	3-4 Times Per Day	More Than 4 Times Per Day
Sweeping	NONE			
Vacuuming				
Water flushing of floors				
Other (specify)				

[ ] Mark (X) this box if you attach a continuation sheet.

9.21 Do you have a written medical action plan for responding to routine or emergency exposure to the listed substance?

Routine exposure

Yes 1

No 2

Emergency exposure

Yes 1

No 2

If yes, where are copies of the plan maintained?

Routine exposure: PLANT SAFETY OFFICE, HOSPITAL E.R.

Emergency exposure: _____

9.22 Do you have a written leak and spill cleanup plan that addresses the listed substance? Circle the appropriate response.

Yes 1

No 2

If yes, where are copies of the plan maintained? _____

Has this plan been coordinated with state or local government response organizations? Circle the appropriate response.

Yes 1

No 2

9.23 Who is responsible for monitoring worker safety at your facility? Circle the appropriate response.

Plant safety specialist 1

Insurance carrier 2

OSHA consultant 3

Other (specify) _____ 4

[ ] Mark (X) this box if you attach a continuation sheet.

SECTION 10 ENVIRONMENTAL RELEASE

General Instructions:

Complete Part E (questions 10.23-10.35) for each non-routine release involving the listed substance that occurred during the reporting year. Report on all releases that are equal to or greater than the listed substance's reportable quantity value, RQ, unless the release is federally permitted as defined in 42 U.S.C. 9601, or is specifically excluded under the definition of release as defined in 40 CFR 302.3(22). Reportable quantities are codified in 40 CFR Part 302. If the listed substance is not a hazardous substance under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and, thus, does not have an RQ, then report releases that exceed 2,270 kg. If such a substance however, is designated as a CERCLA hazardous substance, then report those releases that are equal to or greater than the RQ. The facility may have answered these questions or similar questions under the Agency's Accidental Release Information Program and may already have this information readily available. Assign a number to each release and use this number throughout this part to identify the release. Releases over more than a 24-hour period are not single releases, i.e., the release of a chemical substance equal to or greater than an RQ must be reported as a separate release for each 24-hour period the release exceeds the RQ.

For questions 10.25-10.35, answer the questions for each release identified in question 10.23. Photocopy these questions and complete them separately for each release.

PART A GENERAL INFORMATION

10.01 Where is your facility located? Circle all appropriate responses.

CBI

[ ] Industrial area 1

Urban area 2

Residential area 3

Agricultural area 4

Rural area ..... (5)

Adjacent to a park or a recreational area 6

Within 1 mile of a navigable waterway 7

Within 1 mile of a school, university, hospital, or nursing home facility 8

Within 1 mile of a non-navigable waterway 9

Other (specify) _____ 10

[ ] Mark (X) this box if you attach a continuation sheet.

10.02 Specify the exact location of your facility (from central point where process unit is located) in terms of latitude and longitude or Universal Transverse Mercader (UTM) coordinates.

Latitude ..... NORTH 33 ° 54 ' 31 "

Longitude ..... WEST 89 ° 00 ' 45 "

UTM coordinates ..... Zone _____, Northing _____, Easting _____

10.03 If you monitor meteorological conditions in the vicinity of your facility, provide the following information.

Average annual precipitation ..... N/A inches/year

Predominant wind direction ..... N/A

10.04 Indicate the depth to groundwater below your facility.

Depth to groundwater ..... N/A meters

10.05 For each on-site activity listed, indicate (Y/N/NA) all routine releases of the listed substance to the environment. (Refer to the instructions for a definition of Y, N, and NA.)

CBI

[ ]

On-Site Activity	Environmental Release		
	Air	Water	Land
Manufacturing	NA	NA	NA
Importing	NA	NA	NA
Processing	Y	N	N
Otherwise used	NA	NA	NA
Product or residual storage	Y	N	N
Disposal	NA	NA	NA
Transport	NA	NA	NA

[X] Mark (X) this box if you attach a continuation sheet.

Springer Engineering, Inc.
206 Glenn Street
Starkville, MS 39759
601-323-2296

May 1, 1989

MPI, Inc.
Attn: Paul Wheeler
P.O. Box 408
400 Third Aveneu
Houston, Mississippi 38851

RE: Latitude and Longitude determination
for EPA Stack Emission Requirements

Dear Mr. Wheeler:

In regard to your request that we determine the latitude and longitude of the smoke stack of the main building, I would like to offer the following:

33° 54' 31" North Latitude

89° 00' 45" West Longitude

If you have any questions, or need any additional information, please let me know.

Very truly yours,

Edward Springer, P.E.
SPRINGER ENGINEERING, INC.

ES:gp

10.06 Provide the following information for the listed substance and specify the level of precision for each item. (Refer to the instructions for further explanation and an example.)

CBI

[ ]

Quantity discharged to the air	See ATTACHED	kg/yr ± ___ %
Quantity discharged in wastewaters	N/A	kg/yr ± ___ %
Quantity managed as other waste in on-site treatment, storage, or disposal units	N/A	kg/yr ± ___ %
Quantity managed as other waste in off-site treatment, storage, or disposal units	N/A	kg/yr ± ___ %

[ ] Mark (X) this box if you attach a continuation sheet.

DOW THE DOW CHEMICAL COMPANY

MIDLAND, MICHIGAN 48674

August 4, 1988

Mr. Paul Wheeler
MPI Incorporated
P.O. Box 408
Houston, MS 38851

RE: TDI EMISSIONS

Attached are the preliminary results of an exhaust vent emission survey conducted on July 25, 1988 at MPI Incorporated, Houston MS. The results are based on conditions the day of the survey. Changes in procedures, formulations, equipment or other conditions may invalidate these results. The approximate temperature inside of the plant was 85°F and the relative humidity was 70%.

Measurements were not made using equipment or procedures specified by EPA guidelines respecting emission source monitoring, therefore, no representation is made regarding the accuracy of the results. The values presented are, at best, only rough estimates of actual TDI emissions.

Table 1 describes emission levels from sources where the exhaust rate and the concentration of TDI were both measured. The emission rates are presented as "pounds per hour" (lbs/hr).

Table 2 describes emission levels from sources where only the concentration of TDI was measured. The emission rates are presented as "pounds per cubic foot" (lbs/ft^3). In order to convert these values to lbs/hr they must be multiplied by [60 x exhaust rate given in "cubic feet per minute" (cfm)].

The information contained herein is presented in good faith, however, no guarantee of accuracy or completeness is given. Data presented are believed factual unless otherwise indicated, but conclusions based on such data will not be valid if observed operations change. No representation is made that all existing or potential problems have been identified, or that laws or regulations will be construed by government agencies consistent with our understanding of them.

Sincerely,

John Cikalo

John P. Cikalo
Industrial Hygiene Laboratory
1803 Building
(517)636-2717

Table 2: Vent Emission Rates (lbs/ft^3) of Toluene Diisocyanate (TDI) During Rebond Operations, MPI Incorporated, Houston, Mississippi, July 25, 1988

Exhaust Source	TDI Emission Rate lbs/ft^3
1). "Tub" Head of Extruder	2.36×10^{-8}
2). Process Fan	2.67×10^{-8}
3). Steam Exit #1	6.67×10^{-9} - 1.78×10^{-8}
4). Steam Exit #2	1.11×10^{-8} - 2.67×10^{-8}
5). Glue Room	1.33×10^{-9}

Table 1: Vent Emission Rates (lbs/hr) of Toluene Diisocyanate (TDI) During Rebond Operations, MPI Incorporated, Houston, Mississippi, July 25, 1988

Exhaust Source	TDI Emission Rate lbs/hr
1). Primary Drier	2.29×10^{-3}
2). Secondary Drier	4.6×10^{-4}
3). #1 Hopper (Blender)	0.02*
4). #2 Hopper (" ")	0.02*

* during transfer

THE DOW CHEMICAL COMPANY

INDUSTRIAL HYGIENE REPORT

DATE: December 7, 1988

TITLE

VENT STACK EMISSION SURVEY FOR TOLUENE DIISOCYANATE (TDI) DURING POLYURETHANE FOAM REBOND MOLDING OPERATIONS AT MPI INCORPORATED, HOUSTON, MISSISSIPPI, JULY 25, 1988

AUTHOR

J. P. Cikalo
Industrial Hygiene Laboratory
Health & Environmental Sciences

DISTRIBUTION

W. B. Volpe, Dow Chemical USA
Charlotte, North Carolina

SUMMARY

An exhaust vent survey was conducted on July 25, 1988, at MPI Incorporated, Houston, Mississippi. The primary purpose of this survey was to estimate the air emission rates of toluene diisocyanate (TDI) from nine plant exhaust systems. The configurations or positions of the exhaust vents for five of the systems were such that air velocity measurements (from which to estimate the volumetric flow rate) could not be determined. In these cases, only the concentration of TDI in the exhaust gases was reported (1.33×10^{-9} to 2.67×10^{-8} lb/ft^3). The total TDI emission rate from the remaining four exhaust systems ranged from 0.0028 lb/hr (when the blowers for Hoppers #1 and #2 were not operating) to 4.3×10^{-2} lb/hr (when all blowers were operating).

PURPOSE

An exhaust vent survey was conducted as a service to MPI Incorporated, Houston, Mississippi, in support of products manufactured by The Dow Chemical Company. The primary purpose of this survey was to estimate the vent stack emission rates of TDI during polyurethane foam rebond molding operations.

CONCLUSIONS

The following conclusions are based on conditions that existed on the day of the survey, July 25, 1988. Changes in work habits, operating procedures or equipment may invalidate these conclusions. The approximate temperature inside of the plant was 85° F and the relative humidity was 70%.

1) Of the nine exhaust systems evaluated, the configurations of five were such that air velocity measurements could not be taken, therefore, volumetric flow rates could not be calculated. In these cases, only the concentration of TDI in the exhausted gases and not the emission rate was reported. The concentration of TDI at the exhaust vents of; the "tub" head of the extruder, the process fan, steam exits #1 and #2, and the glue room, ranged from 1.33×10^{-9} to 2.37×10^{-8} lb/ft^3. To determine emission rates in pounds per minute the reported results must be multiplyed by the air volume in units of cubic feet per minute of air exhausted once these values are determined.

2) TDI emission rates for the primary and secondary driers were 0.0023 lb/hr and 0.00046 lb/hr respectively. The blowers for Hoppers #1 and #2 operated only intermittently, and when running, the TDI emission rate for each of the two sources was 0.02 lb/hr.

TOXIC PROPERTIES

Toluene-2,4-Diisocyanate (TDI) is a respiratory irritant, capable of producing nasal irritation, nasal congestion, dry throat, and headache. The most serious toxicologic action is the potential for allergic sensitization of the respiratory tract in man. Sensitization may result from a single high exposure or from repeated excessive exposures. Once sensitized, individuals respond to

extremely low-level exposures with an allergic response characterized by asthma-like breathing, coughing spasms, and cyanosis.

Nonsensitized individuals may experience similar reactions from a single high exposure. The reaction may be delayed several hours after exposure and frequently occurs during nocturnal hours.

Persons with a medical history of chronic respiratory disease or respiratory allergies should not be exposed to TDI.

TDI is also a severe skin and eye irritant. Skin sensitization has been produced in humans whose respiratory tracts were protected by airline respirators but who had repeated skin contact.

SAMPLING AND ANALYTICAL METHODS

The velocity of the air exhausted from each vent was measured, where possible, with an extendible pitot-static tube Type 50-4 (Air Instrument Resources) coupled with an Electronic Digital Microanemometer (Neotronics). Measurements were obtained at the center of each duct opening. Ideally, two ten-point traverse measurements (taken at right angles to each other) should be taken 6 to 8 duct diameter lengths away from any duct configuration that would create disturbances to the airflow.

The GMD Model 920 Autostep monitor was used to measure the concentration of toluene diisocyanate (TDI) at the exhaust vents. It is a direct reading instrument with three operating modes having two ranges for TDI concentration. This unit detects TDI by drawing a metered volume of air through a chemically impregnated paper tape. If TDI is present, a chemical reaction occurs which produces a color stain on the tape. The intensity of the stain is proportional to the concentration of TDI. In the Search Mode the sampling time is 24 seconds or less, depending on the TDI concentration, and the range is from 0.005 ppm to 0.200 ppm TDI. If the concentration exceeds 0.200 ppm, the sampling time is automatically reduced, but a stopwatch can be used to determine the actual sampling time, and the TDI concentration can thus be estimated. In the Survey and Monitor Modes, the sampling time is 4 minutes and the range is from 0.001 to 0.040 ppm. Although the upper limit of detection in the latter two modes should be 0.040 ppm, in actual operation the upper limit is approximately 0.036-0.037 ppm because there is a loss of 0.003 to 0.004 ppm due to a correction for tape background color by the instrument's memory system.

PROCESS DESCRIPTION

The rebond molding process at MPI Inc., Houston, Mississippi, begins by mixing polyurethane foam chips with prepolymer (containing TDI) in blenders. Following a designated period of mixing, the contents of each blender are dumped to the "tub" where a screw conveyer transports the material to an extruder. During the "dump", unreacted TDI vapors can be released through various openings in the conveyer system. In the extruder, the foam-polymer mixture is compressed and heated on a conveyer line to form a continuous "bun".

SURVEY RESULTS

Table 1 summarizes the results of air velocity measurements, volumetric flow rates and emission rates of toluene diisocyanate (TDI) for each of the vents in the plant's nine exhaust systems (some exhaust systems had more than one vent). For systems 5 - 9, the configuration or position of the vents were such that air velocity measurements could not be taken, therefore, volumetric flow rates and emission rates could not be calculated. The concentration of TDI venting from these five systems ranged from 1.22×10^{-8} lb/ft^3 to 2.67×10^{-8} lb/ft^3.

The total TDI emission rates for exhaust systems 1 - 4 are summarized in Table 2. The emission rates for the Primary and Secondary Driers were 0.0023 and 0.00046 lb/hr respectively. During material transfers (the blower did not operate between transfers), the emission rate was 0.02 lb/hr for each of Hoppers #1 and #2 .

The data presented has inherent error based on both the evaluation methods and more importantly due to process conditions and variables. We are not aware of regulatory standards related specifically to TDI emission monitoringor emission limits and can make no judgements as to the acceptability of these data for submission to government agencies.

NOTICE

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Signature: John Cikalo (Author)

Date: Dec. 12/88

Signature: J.W. Ingdahl (Reviewer)

Date: December 13, 1988

dlg

Table 1: SUMMARY OF VENT STACK AIR VELOCITY MEASUREMENTS, VOLUMETRIC FLOW RATES, AND EMISSION RATES OF TOLUENE DIISOCYANATE (TDI) DURING POLYURETHANE FOAM REBOND OPERATIONS, MPI INCORPORATED, HOUSTON, MISSISSIPPI, JULY 25, 1988

Exhaust System	Centerline Velocity (ft/min)	Volume (ft^3/min)	TDI Concentration (ppm)	TDI Concentration (lb/ft^3)	Emission Rate (lb/hr)
1) Primary Drier					0.00029
10" dia. duct	4905	2675	0.004	1.78×10^{-9}	0.002
8" x 15" oval duct	5222	3384	0.022	9.79×10^{-9}	0.0023
2) Secondary Drier					0.00015
14" x 14" square duct	4005	5447	0.001	4.45×10^{-10}	0.00016
14" x 14" square duct	4387	5966	0.001	4.45×10^{-10}	0.00015
14" x 14" square duct	4005	5447	0.001	4.45×10^{-10}	0.00046
3 #1 Hopper					
15" dia. duct	1266	1553	0.491	2.18×10^{-7}	0.02
4) #2 Hopper					
13" dia. duct	1602	1477	0.468	2.08×10^{-7}	0.02
5) "Tub" head of Extruder	NA	NA	0.053	2.36×10^{-8}	NA
6) Process Fan	NA	NA	0.060	2.67×10^{-8}	NA
7) Steam Exit #1	NA	NA	0.028	1.22×10^{-8}	NA
8) Steam Exit #2	NA	NA	0.043	1.89×10^{-8}	NA
9) Glue Room	NA	NA	0.003	1.33×10^{-9}	NA

NA = not available

Table 2: Vent Stack Emission Rates of Toluene Diisocyanate (TDI) During Polyurethane Foam Rebond Operations, MPI Incorporated, Houston, Mississippi, July 25, 1988

Exhaust System	TDI Emission Rate (lb/hr)
1). Primary Drier	0.0023
2). Secondary Drier	0.00046
3). #1 Hopper	0.02*
4). #2 Hopper	0.02 *

* During transfer only. Blower did not operate between transfers.

ADDENDUM

1. Code of Federal Regulations: Title 29, Section 1910.1000, Subpart Z, Toxic and Hazardous Substances.

10.08 Describe the control technologies used to minimize release of the listed substance for each process stream containing the listed substance as identified in your process block or residual treatment block flow diagram(s). Photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... _____

Stream ID Code	Control Technology	Percent Efficiency
N/A		

[ ] Mark (X) this box if you attach a continuation sheet.

PART B RELEASE TO AIR

10.09 CBI [ ] Point Source Emissions -- Identify each emission point source containing the listed substance in terms of a Stream ID Code as identified in your process block or residual treatment block flow diagram(s), and provide a description of each point source. Do not include raw material and product storage vents, or fugitive emission sources (e.g., equipment leaks). Photocopy this question and complete it separately for each process type.

Process type ..... Batch

Point Source ID Code	Description of Emission Point Source
	See attached Emission Report

Block Diagram 1.03

[ ] Mark (X) this box if you attach a continuation sheet.

THE DOW CHEMICAL COMPANY

MIDLAND, MICHIGAN 48674

August 4, 1988

Mr. Paul Wheeler
MPI Incorporated
P.O. Box 408
Houston, MS 38851

RE: TDI EMISSIONS

Attached are the preliminary results of an exhaust vent emission survey conducted on July 25, 1988 at MPI Incorporated, Houston MS. The results are based on conditions the day of the survey. Changes in procedures, formulations, equipment or other conditions may invalidate these results. The approximate temperature inside of the plant was 85°F and the relative humidity was 70%.

Measurements were <u>not</u> made using equipment or procedures specified by EPA guidelines respecting emission source monitoring, therefore, no representation is made regarding the accuracy of the results. The values presented are, at best, only rough estimates of actual TDI emissions.

Table 1 describes emission levels from sources where the exhaust rate and the concentration of TDI were both measured. The emission rates are presented as "pounds per hour" (lbs/hr).

Table 2 describes emission levels from sources where only the concentration of TDI was measured. The emission rates are presented as "pounds per cubic foot" (lbs/ft^3). In order to convert these values to lbs/hr they must be multiplied by [60 x exhaust rate given in "cubic feet per minute" (cfm)].

The information contained herein is presented in good faith, however, no guarantee of accuracy or completeness is given. Data presented are believed factual unless otherwise indicated, but conclusions based on such data will not be valid if observed operations change. No representation is made that all existing or potential problems have been identified, or that laws or regulations will be construed by government agencies consistent with our understanding of them.

Sincerely,

John Cikalo/ca

John P. Cikalo
Industrial Hygiene Laboratory
1803 Building
(517)636-2717

Table 2: Vent Emission Rates (lbs/ft^3) of Toluene Diisocyanate (TDI) During Rebond Operations, MPI Incorporated, Houston, Mississippi, July 25, 1988

Exhaust Source	TDI Emission Rate lbs/ft^3
1). "Tub" Head of Extruder	2.36×10^{-8}
2). Process Fan	2.67×10^{-8}
3). Steam Exit #1	6.67×10^{-9} - 1.78×10^{-8}
4). Steam Exit #2	1.11×10^{-8} - 2.67×10^{-8}
5). Glue Room	1.33×10^{-9}

Table 1: Vent Emission Rates (lbs/hr) of Toluene Diisocyanate (TDI) During Rebond Operations, MPI Incorporated, Houston, Mississippi, July 25, 1988

Exhaust Source	TDI Emission Rate lbs/hr
1). Primary Drier	2.29×10^{-3}
2). Secondary Drier	4.6×10^{-4}
3). #1 Hopper (Blender)	0.02*
4). #2 Hopper (" ")	0.02*

* during transfer

THE DOW CHEMICAL COMPANY

INDUSTRIAL HYGIENE REPORT

DATE: December 7, 1988

TITLE

VENT STACK EMISSION SURVEY FOR TOLUENE DIISOCYANATE (TDI) DURING POLYURETHANE FOAM REBOND MOLDING OPERATIONS AT MPI INCORPORATED, HOUSTON, MISSISSIPPI, JULY 25, 1988

AUTHOR

J. P. Cikalo
Industrial Hygiene Laboratory
Health & Environmental Sciences

DISTRIBUTION

W. B. Volpe, Dow Chemical USA
Charlotte, North Carolina

SUMMARY

An exhaust vent survey was conducted on July 25, 1988, at MPI Incorporated, Houston, Mississippi. The primary purpose of this survey was to estimate the air emission rates of toluene diisocyanate (TDI) from nine plant exhaust systems. The configurations or positions of the exhaust vents for five of the systems were such that air velocity measurements (from which to estimate the volumetric flow rate) could not be determined. In these cases, only the concentration of TDI in the exhaust gases was reported (1.33×10^{-9} to 2.67×10^{-8} lb/ft^3). The total TDI emission rate from the remaining four exhaust systems ranged from 0.0028 lb/hr (when the blowers for Hoppers #1 and #2 were not operating) to 4.3×10^{-2} lb/hr (when all blowers were operating).

PURPOSE

An exhaust vent survey was conducted as a service to MPI Incorporated, Houston, Mississippi, in support of products manufactured by The Dow Chemical Company. The primary purpose of this survey was to estimate the vent stack emission rates of TDI during polyurethane foam rebond molding operations.

CONCLUSIONS

The following conclusions are based on conditions that existed on the day of the survey, July 25, 1988. Changes in work habits, operating procedures or equipment may invalidate these conclusions. The approximate temperature inside of the plant was 85° F and the relative humidity was 70%.

1) Of the nine exhaust systems evaluated, the configurations of five were such that air velocity measurements could not be taken, therefore, volumetric flow rates could not be calculated. In these cases, only the concentration of TDI in the exhausted gases and not the emission rate was reported. The concentration of TDI at the exhaust vents of; the "tub" head of the extruder, the process fan, steam exits #1 and #2, and the glue room, ranged from 1.33×10^{-9} to 2.67×10^{-8} lb/ft^3. To determine emission rates in pounds per minute the reported results must be multiplyed by the air volume in units of cubic feet per minute of air exhausted once these values are determined.

2) TDI emission rates for the primary and secondary driers were 0.0023 lb/hr and 0.00046 lb/hr respectively. The blowers for Hoppers #1 and #2 operated only intermittently, and when running, the TDI emission rate for each of the two sources was 0.02 lb/hr.

TOXIC PROPERTIES

Toluene-2,4-Diisocyanate (TDI) is a respiratory irritant, capable of producing nasal irritation, nasal congestion, dry throat, and headache. The most serious toxicologic action is the potential for allergic sensitization of the respiratory tract in man. Sensitization may result from a single high exposure or from repeated excessive exposures. Once sensitized, individuals respond to

extremely low level exposures with an allergic response characterized by asthma-like breathing, coughing spasms, and cyanosis.

Nonsensitized individuals may experience similar reactions from a single high exposure. The reaction may be delayed several hours after exposure and frequently occurs during nocturnal hours.

Persons with a medical history of chronic respiratory disease or respiratory allergies should not be exposed to TDI.

TDI is also a severe skin and eye irritant. Skin sensitization has been produced in humans whose respiratory tracts were protected by airline respirators but who had repeated skin contact.

SAMPLING AND ANALYTICAL METHODS

The velocity of the air exhausted from each vent was measured, where possible, with an extendible pitot-static tube Type 50-4 (Air Instrument Resources) coupled with an Electronic Digital Microanemometer (Neotronics). Measurements were obtained at the center of each duct opening. Ideally, two ten-point traverse measurements (taken at right angles to each other) should be taken 6 to 8 duct diameter lengths away from any duct configuration that would create disturbances to the airflow.

The GMD Model 920 Autostep monitor was used to measure the concentration of toluene diisocyanate (TDI) at the exhaust vents. It is a direct reading instrument with three operating modes having two ranges for TDI concentration. This unit detects TDI by drawing a metered volume of air through a chemically impregnated paper tape. If TDI is present, a chemical reaction occurs which produces a color stain on the tape. The intensity of the stain is proportional to the concentration of TDI. In the Search Mode the sampling time is 24 seconds or less, depending on the TDI concentration, and the range is from 0.005 ppm to 0.200 ppm TDI. If the concentration exceeds 0.200 ppm, the sampling time is automatically reduced, but a stopwatch can be used to determine the actual sampling time, and the TDI concentration can thus be estimated. In the Survey and Monitor Modes, the sampling time is 4 minutes and the range is from 0.001 to 0.040 ppm. Although the upper limit of detection in the latter two modes should be 0.040 ppm, in actual operation the upper limit is approximately 0.036-0.037 ppm because there is a loss of 0.003 to 0.004 ppm due to a correction for tape background color by the instrument's memory system.

PROCESS DESCRIPTION

The rebond molding process at MPI Inc., Houston, Mississippi, begins by mixing polyurethane foam chips with prepolymer (containing TDI) in blenders. Following a designated period of mixing, the contents of each blender are dumped to the "tub" where a screw conveyer transports the material to an extruder. During the "dump", unreacted TDI vapors can be released through various openings in the conveyer system. In the extruder, the foam-polymer mixture is compressed and heated on a conveyer line to form a continuous "bun".

SURVEY RESULTS

Table 1 summarizes the results of air velocity measurements, volumetric flow rates and emission rates of toluene diisocyanate (TDI) for each of the vents in the plant's nine exhaust systems (some exhaust systems had more than one vent). For systems 5 - 9, the configuration or position of the vents were such that air velocity measurements could not be taken, therefore, volumetric flow rates and emission rates could not be calculated. The concentration of TDI venting from these five systems ranged from 1.22×10^{-8} lb/ft^3 to 2.67×10^{-8} lb/ft^3.

The total TDI emission rates for exhaust systems 1 - 4 are summarized in Table 2. The emission rates for the Primary and Secondary Driers were 0.0023 and 0.00046 lb/hr respectively. During material transfers (the blower did not operate between transfers), the emission rate was 0.02 lb/hr for each of Hoppers #1 and #2 .

The data presented has inherent error based on both the evaluation methods and more importantly due to process conditions and variables. We are not aware of regulatory standards related specifically to TDI emission monitoringor emission limits and can make no judgements as to the acceptability of these data for submission to government agencies.

NOTICE

The information and any recommendations contained herein are presented in good faith. However, no guarantee of accuracy or completeness is given. Data presented are believed factual unless otherwise indicated, but conclusions based on such data will not be valid if observed operations change. No representation is made that all existing or potential problems have been identified, or that recommendations made will solve the problem, or that laws or regulations will be construed by government agencies consistent with our understanding of them.

Signature: John Cikato (Author)

Date: Dec. 12/88

Signature: J. W. Ingdahl (Reviewer)

Date: December 13, 1988

dlg

Table 1: SUMMARY OF VENT STACK AIR VELOCITY MEASUREMENTS, VOLUMETRIC FLOW RATES, AND EMISSION RATES OF TOLUENE DIISOCYANATE (TDI) DURING POLYURETHANE FOAM REBOND OPERATIONS, MPI INCORPORATED, HOUSTON, MISSISSIPPI, JULY 25, 1988

Exhaust System	Centerline Velocity (ft/min)	Volume (ft^3/min)	TDI Concentration (ppm)	TDI Concentration (lb/ft^3)	Emission Rate (lb/hr)
1) Primary Drier					0.00029
10" dia. duct	4905	2675	0.004	1.78×10^{-9}	0.002
8" x 15" oval duct	5222	3384	0.022	9.79×10^{-9}	0.0023
2) Secondary Drier					0.00015
14" x 14" square duct	4005	5447	0.001	4.45×10^{-10}	0.00016
14" x 14" square duct	4387	5966	0.001	4.45×10^{-10}	0.00015
14" x 14" square duct	4005	5447	0.001	4.45×10^{-10}	0.00046
3 #1 Hopper					
15" dia. duct	1266	1553	0.491	2.18×10^{-7}	0.02
4) #2 Hopper					
13" dia. duct	1602	1477	0.468	2.08×10^{-7}	0.02
5) "Tub" head of Extruder	NA	NA	0.053	2.36×10^{-8}	NA
6) Process Fan	NA	NA	0.060	2.67×10^{-8}	NA
7) Steam Exit #1	NA	NA	0.028	1.22×10^{-8}	NA
8) Steam Exit #2	NA	NA	0.043	1.89×10^{-8}	NA
9) Glue Room	NA	NA	0.003	1.33×10^{-9}	NA

NA = not available

Table 2: Vent Stack Emission Rates of Toluene Diisocyanate (TDI) During Polyurethane Foam Rebond Operations, MPI Incorporated, Houston, Mississippi, July 25, 1988

Exhaust System	TDI Emission Rate (lb/hr)
1). Primary Drier	0.0023
2). Secondary Drier	0.00046
3). #1 Hopper	0.02*
4). #2 Hopper	0.02 *

* During transfer only. Blower did not operate between transfers.

ADDENDUM

1. Code of Federal Regulations: Title 29, Section 1910.1000, Subpart Z, Toxic and Hazardous Substances.

10.10 Emission Characteristics - - Characterize the emissions for each Point Source ID Code identified in question 10.09 by completing the following table.

CBI

[ ]

Point Source ID Code	Physical State[1]	Average Emissions (kg/day)	Frequency[2] (days/yr)	Duration[3] (min/day)	Average Emission Factor[4]	Maximum Emission Rate (kg/min)	Maximum Emission Rate Frequency (events/yr)	Maximum Emission Rate Duration (min/event)
	✓							

[1]Use the following codes to designate physical state at the point of release:
G = Gas; V = Vapor; P = Particulate; A = Aerosol; O = Other (specify) _____

[2]Frequency of emission at any level of emission

[3]Duration of emission at any level of emission

[4]Average Emission Factor — Provide estimated (± 25 percent) emission factor (kg of emission per kg of production of listed substance)

[ ] Mark (X) this box if you attach a continuation sheet.

10.11 Stack Parameters -- Identify the stack parameters for each Point Source ID Code identified in question 10.09 by completing the following table.

CBI

[ ]

Point Source ID Code	Stack Height(m)	Stack Inner Diameter (at outlet) (m)	Exhaust Temperature (°C)	Emission Exit Velocity (m/sec)	Building Height(m)[1]	Building Width(m)[2]	Vent Type[3]
							✓
							✓
							✓
							✓
							✓

[1]Height of attached or adjacent building

[2]Width of attached or adjacent building

[3]Use the following codes to designate vent type:

H = Horizontal
V = Vertical

[ ] Mark (X) this box if you attach a continuation sheet.

10.12 If the listed substance is emitted in particulate form, indicate the particle size distribution for each Point Source ID Code identified in question 10.09. Photocopy this question and complete it separately for each emission point source.

CBI

[ ]

Point source ID code ..... _____

Size Range (microns)	Mass Fraction (% ± % precision)
< 1	N/A
≥ 1 to < 10	
≥ 10 to < 30	
≥ 30 to < 50	
≥ 50 to < 100	
≥ 100 to < 500	
≥ 500	

Total = 100%

[ ] Mark (X) this box if you attach a continuation sheet.

PART C FUGITIVE EMISSIONS

10.13 Equipment Leaks -- Complete the following table by providing the number of equipment types listed which are exposed to the listed substance and which are in service according to the specified weight percent of the listed substance passing through the component. Do this for each process type identified in your process block or residual treatment block flow diagram(s). Do not include equipment types that are not exposed to the listed substance. If this is a batch or intermittently operated process, give an overall percentage of time per year that the process type is exposed to the listed substance. Photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... Batch

Percentage of time per year that the listed substance is exposed to this process type ..... 100 %

Equipment Type	Number of Components in Service by Weight Percent of Listed Substance in Process Stream					
	Less than 5%	5-10%	11-25%	26-75%	76-99%	Greater than 99%
Pump seals[1]						
Packed						
Mechanical						
Double mechanical[2]						
Compressor seals[1]						
Flanges						
Valves						
Gas[3]						
Liquid						
Pressure relief devices[4] (Gas or vapor only)	N/A					
Sample connections						
Gas	N/A					
Liquid	N/A					
Open-ended lines[5] (e.g., purge, vent)						
Gas	N/A					
Liquid	N/A					

[1]List the number of pump and compressor seals, rather than the number of pumps or compressors

10.13 continued on next page

[ ] Mark (X) this box if you attach a continuation sheet.

(1)

TDI TANK A (VERTICAL)

dia: 121" (10.0 ft)
h: 88" (7.33 ft)
V: 4,378 gals

I. TDI Fixed Roof Breathing Loss

$$L_B = 2.26 \times 10^{-2} M_v \left(\frac{P}{P_a - P}\right)^{.68} D^{1.73} H^{.51} \Delta T^{.5} F_p C K_c$$

$$L_B = 2.26 \times 10^{-2} (174.2) \left(\frac{.1}{14.7 - .1}\right)^{.68} (10\,ft)^{1.73} (3.67\,ft)^{.51} (20°F)^{.5} (1.4)(.5)(1.0)$$

$L_B = 43.35$ lbs/yr

II. TDI Fixed Roof Storage Loss

$$L_W = 2.40 \times 10^{-5} M_v P V N K_n K_c$$

$$L_W = 174.2(.1)(4,378)(1)(1)(2.40 \times 10^{-5})(5.79)$$

$L_W = 10.59$

III. Tank B (Horizontal) dia: 121 (10 ft) h: 204 V: 11,744 gal

TDI fixed Roof Breathing loss

$$L_B = 2.26 \times 10^{-2} M_v \left(\frac{P}{P_a - P}\right)^{.68} D^{1.73} H^{.51} \Delta T^{.5} F_p C K_c$$

$$L_B = (2.26 \times 10^{-2})(174.2) \left(\frac{.1}{14.7 - .1}\right)^{.68} (10\,ft)^{1.73} (20°F)^{.5} (1.4)(1.0)(.5)(10)^{.51}$$

$L_B = 72.27$ lbs/yr

TDI Fixed Roof Storage Loss

$$L_W = 2.40 \times 10^{-5} M_v P V N K_n K_c$$

$$L_W = (2.40 \times 10^{-5})(174.2)(.1)(11,744)(5.84)(1)(1.0)$$

$L_W = 28.67$ lbs/year

(2)

A. Turnovers Per Year

Turnovers per year - Annual Throughput (gal) / Tank Capacity (gal) — 36 or less, $K_{TU} = 1.0$

Total IDI usage 956,717 lbs

Total Tank Capacity 4,378 + 11,744 = 16,122 gals

16,122 gals (10.1748 lbs / 1 gal) = 164,096 lbs

Specific Gravity = $\frac{D_{IDI}}{D_{H_2O}}$ $1.22 = \frac{x}{8.34 \text{ lbs/gal}}$

956,717 lbs (1 gal / 10.1748 lbs) = 94,028 gal

$X = (1.22)(8.34 \text{ lbs/gal})$

$X = 10.1748 \text{ lbs/gal}$

Turnover per year = $\frac{94,028 \text{ gal}}{16,122 \text{ gal}}$

$= 5.83 < 36 = 1.0$

Ratio of Tank Capacities

4,378 gal / 16,122 gal = 27% (Tank A)

11,744 gal / 16,122 gal = 73% (Tank B)

Tank A = 25,388 / 4,378 = 5.79

Tank B = 68,640 / 11,744 = 5.84

956,717 lbs (.27) = 258,314 lbs (Tank A)

956,717 lbs (.73) = 698,403 lbs (Tank B)

698,403 / 956,717

94,028 gal x (.27) = 25,388 gal (Tank A)

94,028 gal (.73) = 68,640 gal (Tank B)

94,028

8

TDI LEAKS PER VESSELS, Pipes, valves, etc estimated values

Source	#		Factor		
pump	1	X	.047	=	.047
in line valves	5	X	.00051	=	.00255
open ended valves	4	X	.0037	=	.0148
flanges	2	X	.0018	=	.0036
Sample connection	1	X	.033	=	.033
safety release valves	1	X	.23	=	.23
Coupling / Compressor	2	X	.50	=	1.0
					1.328655 lbs/hr.
				X	~~4919~~ 3900
					~~6535.65~~

please contact 8-2-88 8-005
How long does it take to unload a rail car
How long does it take to make a batch of resin? (5 minutes)
How many batches per week? (15 batches)

TDI Point Emissions Loss per production Line

$$\left(\frac{956,717 \text{ lbs}}{2200 \text{ lbs}}\right)\left(\frac{53g}{1}\right)\left(\frac{1 \text{ lbs}}{454g}\right) = 50.766 \text{ lbs}$$

$$5 \text{ min}\left(\frac{15 \text{ batches}}{\text{week}}\right)\left(\frac{52}{1}\right) = 3900 \text{ min}$$

$$\left(\frac{3900 \text{ min}}{60 \text{ min/hr}}\right) = 65 \text{ hrs} (1.328)$$

86.32

TDI

Point losses

50.766 (lbs) pLL

50.76

Fugative losses

43.35 lbs FRBC (A)
10.59 lbs FRSC (A)
72.27 lbs FRBC (B)
28.67 lbs FRSC (B)
154.88
86.32 lbs
241.2 lbs

(4)

Toluene-2,4 diisocyanate (Boil

point losses 50.76 (.8) = 40.608

fugative losses 241.2 (.8) = 192.96

Toluene:2,6 diisocyanate (20%)

point 50.76 (.2) = 10.152

fugative 241.2 (.2) = 48.24

10.13 (continued)

[2]If double mechanical seals are operated with the barrier (B) fluid at a pressure greater than the pump stuffing box pressure and/or equipped with a sensor (S) that will detect failure of the seal system, the barrier fluid system, or both, indicate with a "B" and/or an "S", respectively

[3]Conditions existing in the valve during normal operation

[4]Report all pressure relief devices in service, including those equipped with control devices

[5]Lines closed during normal operation that would be used during maintenance operations

10.14 Pressure Relief Devices with Controls -- Complete the following table for those pressure relief devices identified in 10.13 to indicate which pressure relief devices in service are controlled. If a pressure relief device is not controlled, enter "None" under column c.

CBI

[ ]

a. Number of Pressure Relief Devices	b. Percent Chemical in Vessel[1]	c. Control Device	d. Estimated Control Efficiency[2]
NONE		NONE	

[1]Refer to the table in question 10.13 and record the percent range given under the heading entitled "Number of Components in Service by Weight Percent of Listed Substance" (e.g., <5%, 5-10%, 11-25%, etc.)

[2]The EPA assigns a control efficiency of 100 percent for equipment leaks controlled with rupture discs under normal operating conditions. The EPA assigns a control efficiency of 98 percent for emissions routed to a flare under normal operating conditions

[ ] Mark (X) this box if you attach a continuation sheet.

10.15 Equipment Leak Detection -- If a formal leak detection and repair program is in place, complete the following table regarding those leak detection and repair procedures. Photocopy this question and complete it separately for each process type.

CBI

[ ] Process type ..... N/A

Equipment Type	Leak Detection Concentration (ppm or mg/m^3) Measured at ____ Inches from Source	Detection Device[1]	Frequency of Leak Detection (per year)	Repairs Initiated (days after detection)	Repairs Completed (days after initiated)
Pump seals					
Packed					
Mechanical					
Double mechanical					
Compressor seals					
Flanges					
Valves					
Gas					
Liquid					
Pressure relief devices (gas or vapor only)					
Sample connections					
Gas					
Liquid					
Open-ended lines					
Gas					
Liquid					

[1]Use the following codes to designate detection device:

POVA = Portable organic vapor analyzer
FPM = Fixed point monitoring
O = Other (specify) _____

[ ] Mark (X) this box if you attach a continuation sheet.

[ ] Mark (X) this box if you attach a continuation sheet.

10.16 Raw Material, Intermediate and Product Storage Emissions - - Complete the following table by providing the information on each liquid raw material, intermediate, and product storage vessel containing the listed substance as identified in your process block or residual treatment block flow diagram(s).

CBI

[ ]

Vessel Type[1]	Floating Roof Seals[2]	Composition of Stored Materials[3]	Throughput (liters per year)	Vessel Filling Rate (gpm)	Vessel Filling Duration (min)	Vessel Inner Diameter (m)	Vessel Height (m)	Operating Vessel Volume (l)	Vessel Emission Controls[4]	Design Flow Rate[5]	Vent Diameter (cm)	Control Efficiency (%)	Basis for Estimate[6]

[1]Use the following codes to designate vessel type:

F = Fixed roof
CIF = Contact internal floating roof
NCIF = Noncontact internal floating roof
EFR = External floating roof
P = Pressure vessel (indicate pressure rating)
H = Horizontal
U = Underground

[2]Use the following codes to designate floating roof seals:

MS1 = Mechanical shoe, primary
MS2 = Shoe-mounted secondary
MS2R = Rim-mounted, secondary
LM1 = Liquid-mounted resilient filled seal, primary
LM2 = Rim-mounted shield
LMW = Weather shield
VM1 = Vapor mounted resilient filled seal, primary
VM2 = Rim-mounted secondary
VMW = Weather shield

[3]Indicate weight percent of the listed substance. Include the total volatile organic content in parenthesis

[4]Other than floating roofs

[5]Gas/vapor flow rate the emission control device was designed to handle (specify flow rate units)

[6]Use the following codes to designate basis for estimate of control efficiency:

C = Calculations
S = Sampling

PART E NON-ROUTINE RELEASES

10.23 Indicate the date and time when the release occurred and when the release ceased or was stopped. If there were more than six releases, attach a continuation sheet and list all releases.

Release	Date Started	Time (am/pm)	Date Stopped	Time (am/pm)
1	NONE			
2				
3				
4				
5				
6				

10.24 Specify the weather conditions at the time of each release.

Release	Wind Speed (km/hr)	Wind Direction	Humidity (%)	Temperature (°C)	Precipitation (Y/N)
1	NONE				
2					
3					
4					
5					
6					

[ ] Mark (X) this box if you attach a continuation sheet.

10.25 Complete the following information for each media into which the listed substance was released. Any volatile substance that was released to land, but that was expected to volatilize, should be listed as a release to air.

Release No. ..... _____

Media	Quantity (kg)	Method of Release	Migration Beyond Boundaries (Y/N)	Quantity Migrated (kg)
Land	NONE			
Air	NONE			
Groundwater				
Surface water				

10.26 Specify the physical state and concentration of the listed substance at the time and point of release.

Release No. ..... NONE

Point of release ..... _____

Physical state ..... _____

Concentration (%) ..... _____

[ ] Mark (X) this box if you attach a continuation sheet.

10.27 Circle all appropriate responses relating to the cause and the effects of the release.

Release No. ..... NONE

Cause of Release

Equipment failure 1

Operator error 2

Bypass condition 3

Upset condition 4

Fire 5

Unknown 6

Other (specify) _____ 7

Results of Release

Spill 1

Vapor release 2

Explosion 3

Fire 4

Other (specify) _____ 5

[ ] Mark (X) this box if you attach a continuation sheet.

10.28 Specify which authorities were notified of the release.

Release No. ..... NONE

a. Federal

Agency [ ]

Office [ ]

Contact Person [ ]

Address [ ]
Street

[ ]
City

[ ][ ]
State

Telephone Number ..... [ ][ ][ ]-[ ][ ][ ]-[ ][ ][ ][ ]

Date Notified ..... [ ][ ] [ ][ ] [ ][ ]
Mo. Day Year

Time Notified ..... [ ][ ][ ][ ] am/pm

b. State

Agency [ ]

Office [ ]

Contact Person [ ]

Address [ ]
Street

[ ]
City

[ ][ ]
State

Telephone Number ..... [ ][ ][ ]-[ ][ ][ ]-[ ][ ][ ][ ]

Date Notified ..... [ ][ ] [ ][ ] [ ][ ]
Mo. Day Year

Time Notified ..... [ ][ ][ ][ ] am/pm

10.28 continued below

[ ] Mark (X) this box if you attach a continuation sheet.

10.28 (continued)

c. Local

Agency [__]

Office [__]

Contact Person [__]

Address [__]
Street

[__]
City

[__][__]
State

Telephone Number ..... [__][__][__]-[__][__][__]-[__][__][__][__]

Date Notified ..... [__][__] [__][__] [__][__]
Mo. Day Year

Time Notified ..... [__][__][__][__] am/pm

10.29 For each of the proximities listed below, indicate whether the population living within that proximity was notified of, or evacuated because of the release. Specify who notified the population, the number of people evacuated, if any, and the date and time of day the evacuation began.

Release No. ..... _____

Proximity to the Release	Notified of Release (Y/N)	Notifying Person	Notifying Person's Telephone Number	Area Evacuated (Y/N)	Number of Persons Evacuated	Date and Time of Day Evacuation Began
1/4 mile						
1/2 mile						
1 mile						
Other (specify)						

[__] Mark (X) this box if you attach a continuation sheet.

10.30 Specify the number of personal injuries or casualties resulting from the release.

Release No. ..... NONE

Number of injuries to facility employees ..... _____

Number of injuries to general population ..... _____

Number of deaths to facility employees ..... _____

Number of deaths to general population ..... _____

10.31 Indicate who conducted cleanup activities, and the dates over which the cleanup was performed.

Release No. ..... NONE

Name [__]

Address [__]
Street

[__]
City

[__][__] [__][__][__][__][__]--[__][__][__][__]
State Zip

Telephone Number ..... [__][__][__]-[__][__][__]-[__][__][__][__]

Date Cleanup Initiated ..... [__][__][__][__]
Mo. Year

Date Cleanup Completed (or expected) ..... [__][__][__][__]
Mo. Year

10.32 Briefly describe the release prevention practices and policies (backup systems, containment systems, training programs, etc.) in place at the facility at the time the release occurred.

Release No. ..... NONE

[__] Mark (X) this box if you attach a continuation sheet.

10.33 Indicate which of the prevention practices and policies listed in question 10.32 were ineffective in preventing the release from reaching the environment.

Release No. ..... NONE

10.34 Describe all repairs and/or preventive measures (management practices, operational changes, etc.) made to equipment or operations as a result of the release.

Release No. ..... NONE

10.35 Describe additional preventive measures that will be taken to minimize the possibilities of recurrence.

Release No. ..... NONE

[ ] Mark (X) this box if you attach a continuation sheet.